

**FAREWELL ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE
GEOPHYSICAL SURVEY DATA COMPILATION**

Burns, L.E., Graham, G.R.C., Emond, A.M., Barefoot, J.D., CGG, and Fugro GeoServices Inc.

Geophysical Report 2019-12

2019
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



STATE OF ALASKA

Michael J. Dunleavy, Governor

DEPARTMENT OF NATURAL RESOURCES

Corri A. Feige, Commissioner

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Steve Masterman, State Geologist & Director

Publications produced by the Division of Geological & Geophysical Surveys are available to download from the DGGs website (dgggs.alaska.gov). Publications on hard-copy or digital media can be examined or purchased in the Fairbanks office:

Alaska Division of Geological & Geophysical Surveys (DGGs)

3354 College Road | Fairbanks, Alaska 99709-3707

Phone: 907.451.5010 | Fax 907.451.5050

dggspubs@alaska.gov | dgggs.alaska.gov

DGGs publications are also available at:

Alaska State Library, Historical
Collections & Talking Book Center
395 Whittier Street
Juneau, Alaska 99801

Alaska Resource Library and
Information Services (ARLIS)
3150 C Street, Suite 100
Anchorage, Alaska 99503

Suggested citation:

Burns, L.E., Graham, G.R.C., Emond, A.M., Barefoot, J.D., CGG, and Fugro GeoServices Inc., 2019, Farewell electromagnetic, magnetic, and radiometric airborne geophysical survey data compilation: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2019-12. <http://doi.org/10.14509/30190>



FAREWELL ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.¹, Graham, G.R.C.¹, Emond, A.M.¹, Barefoot, J.D.¹, CGG, and Fugro GeoServices Inc.

ABSTRACT

The Farewell geophysical survey is located in the Alaska Range of southcentral Alaska in the Yentna and McGrath mining districts, about 150 kilometers northwest of Anchorage, Alaska. Frequency domain electromagnetic, magnetic, and radiometric data were collected with the DIGHEMV system from September 12th to November 3rd, 2012 and June 29th to September 27th, 2013. A total of 7187.5 line kilometers were collected covering 2544.9 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform (“bird”) on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska’s most promising mineral belts and districts. The information acquired is aimed at catalyzing new private sector exploration, discovery, and ultimate development and production. The primary goal of the Farewell project is to delineate prospective mineral zones and to support detailed geologic mapping. Many prospects are in the survey area and are thought to represent several different deposit types, including polymetallic veins, epithermal veins, and porphyry copper deposits.

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, the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project (SCMA), and by a contribution from Cook Inlet Region, Inc.

¹ Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor	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	Printable maps in pdf format
maps_prn_format	contractor	Printable maps in HPGL/2 printer file format with extension .prn
profiles_stacked	contractor	Distance-based profiles of the digitally recorded geophysical data are generated and plotted at an appropriate scale. The profiles display electromagnetic anomalies with their respective interpretive symbols. Printable in pdf format
vector_data	contractor and DGGS	Line path, data contours, and survey boundary in ESRI shapefile (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format
video_flightpath	contractor	Survey flight path downward facing video

REFERENCES

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

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

Burns, L.E., CGG, and Fugro GeoServices, Inc., 2014, Farewell survey area: Airborne magnetic, electromagnetic and radiometric data in line (point), grid, vector, and map formats, McGrath and Lime Hills quadrangles, south-central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2014-2, scale 1:63,360, 1 DVD. <http://doi.org/10.14509/27291>

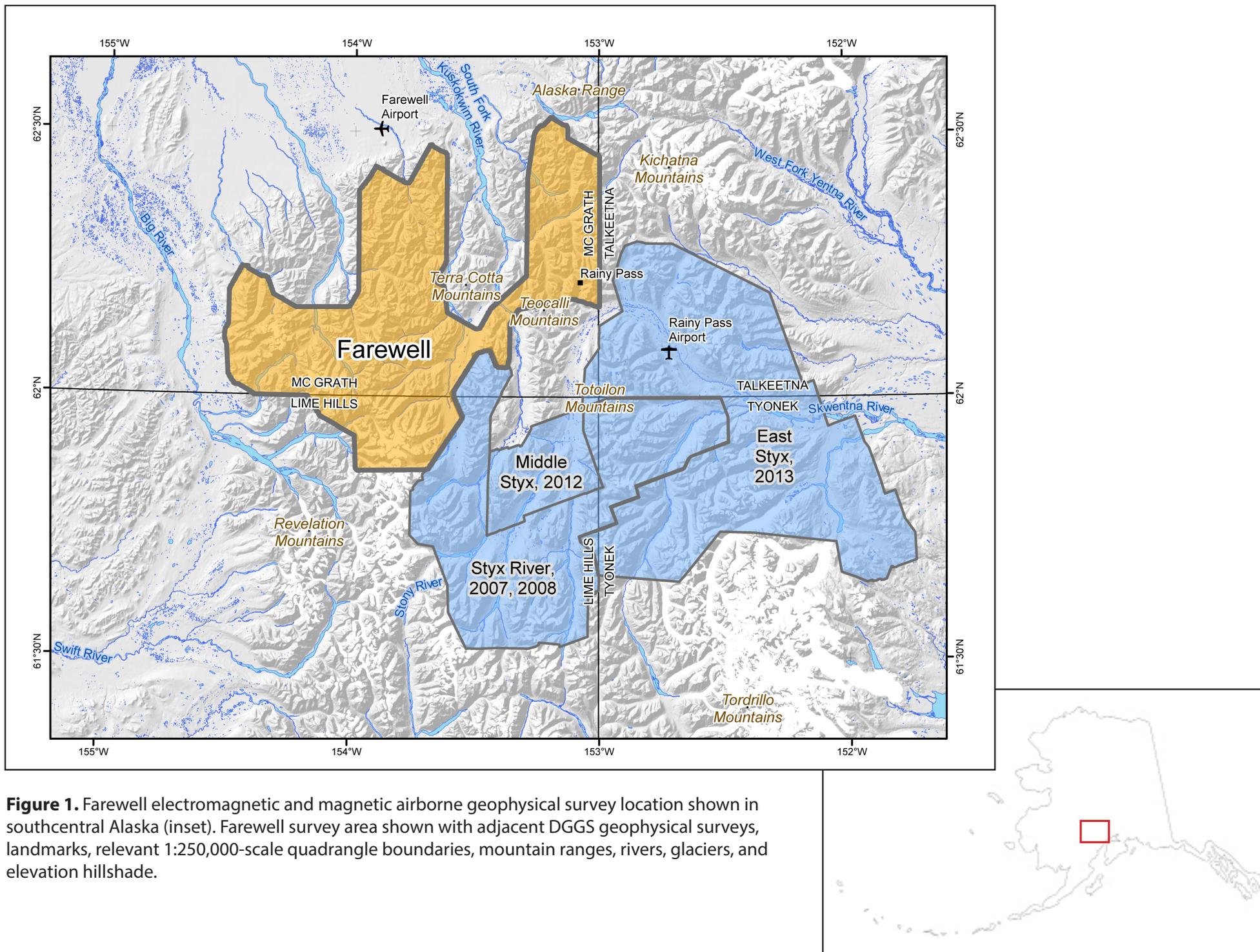


Figure 1. Farewell electromagnetic and magnetic airborne geophysical survey location shown in southcentral Alaska (inset). Farewell survey area shown with adjacent DGGs geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.

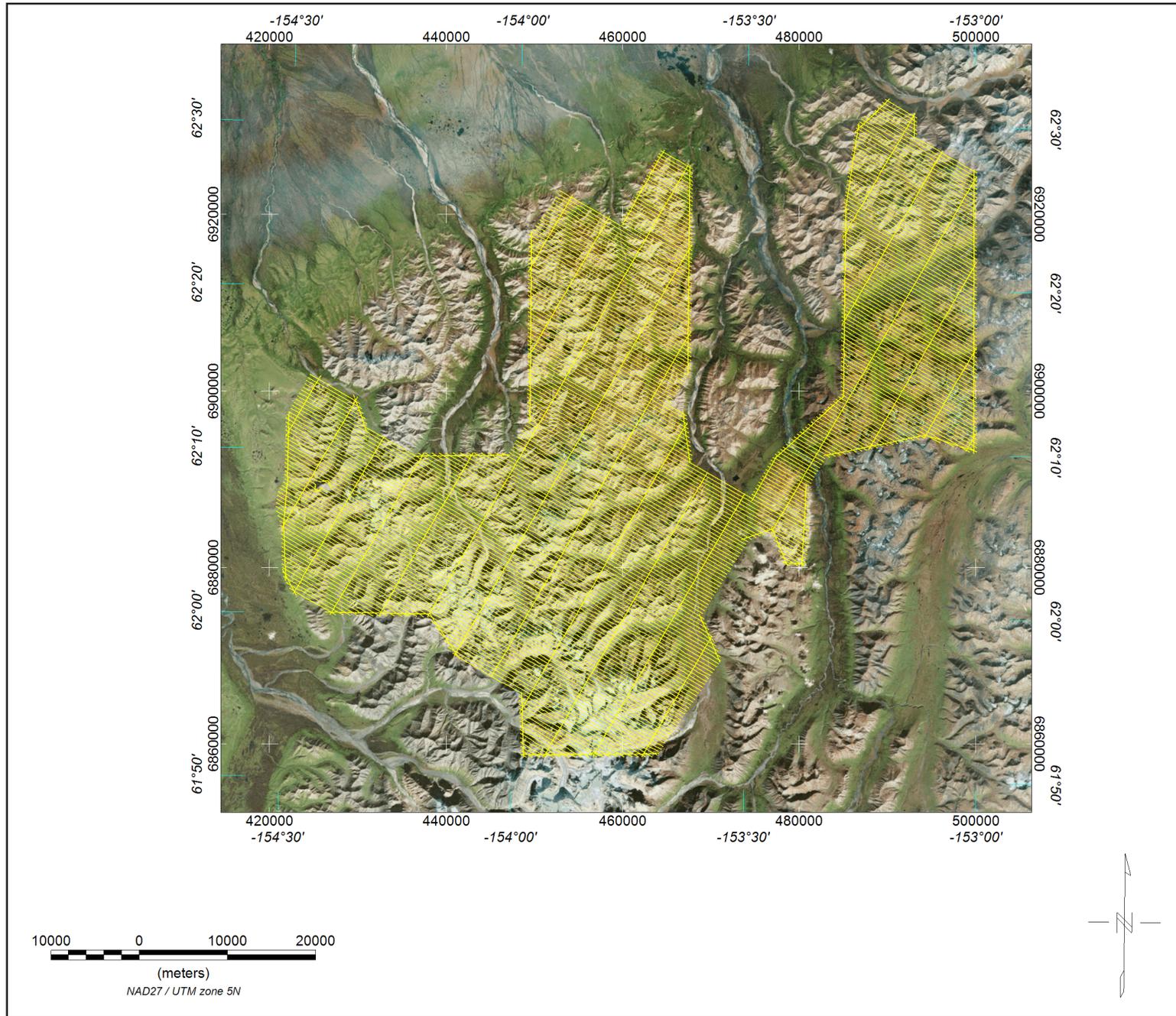


Figure 2. Flight path with orthometric image.

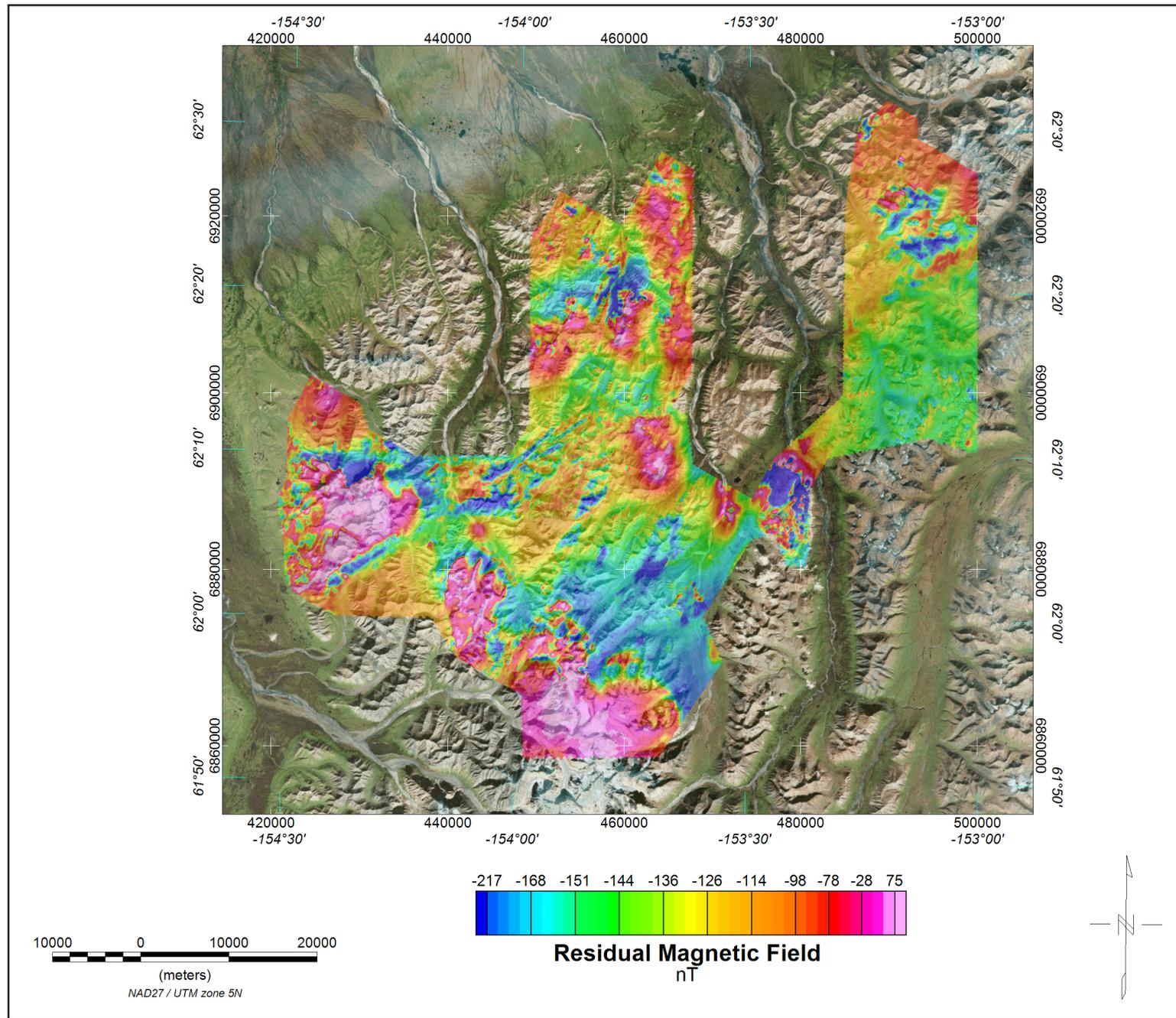


Figure 3. The magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded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

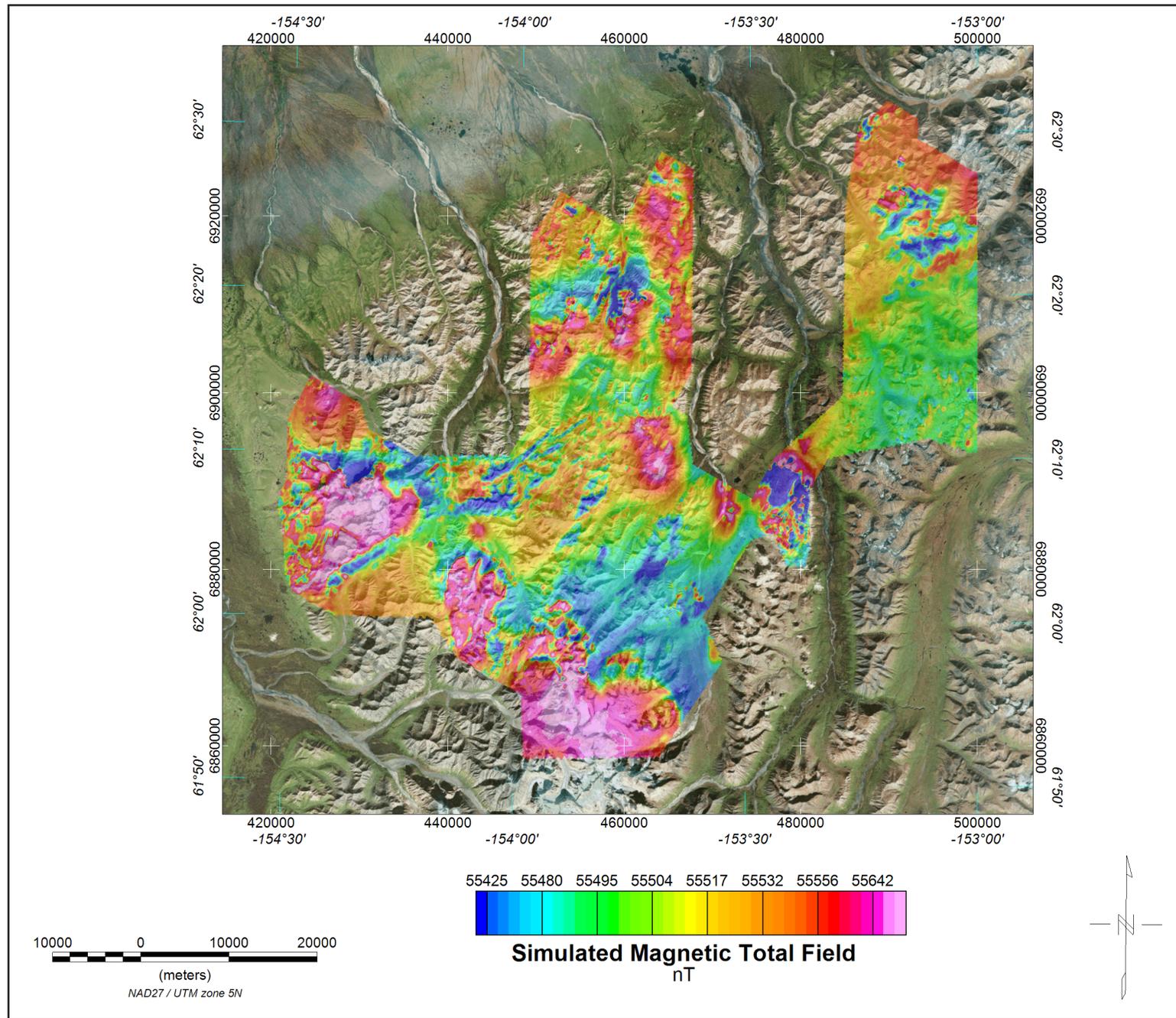


Figure 4. The simulated magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, (4) a constant value of approximately 55,000 nT was added to all data, and (5) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

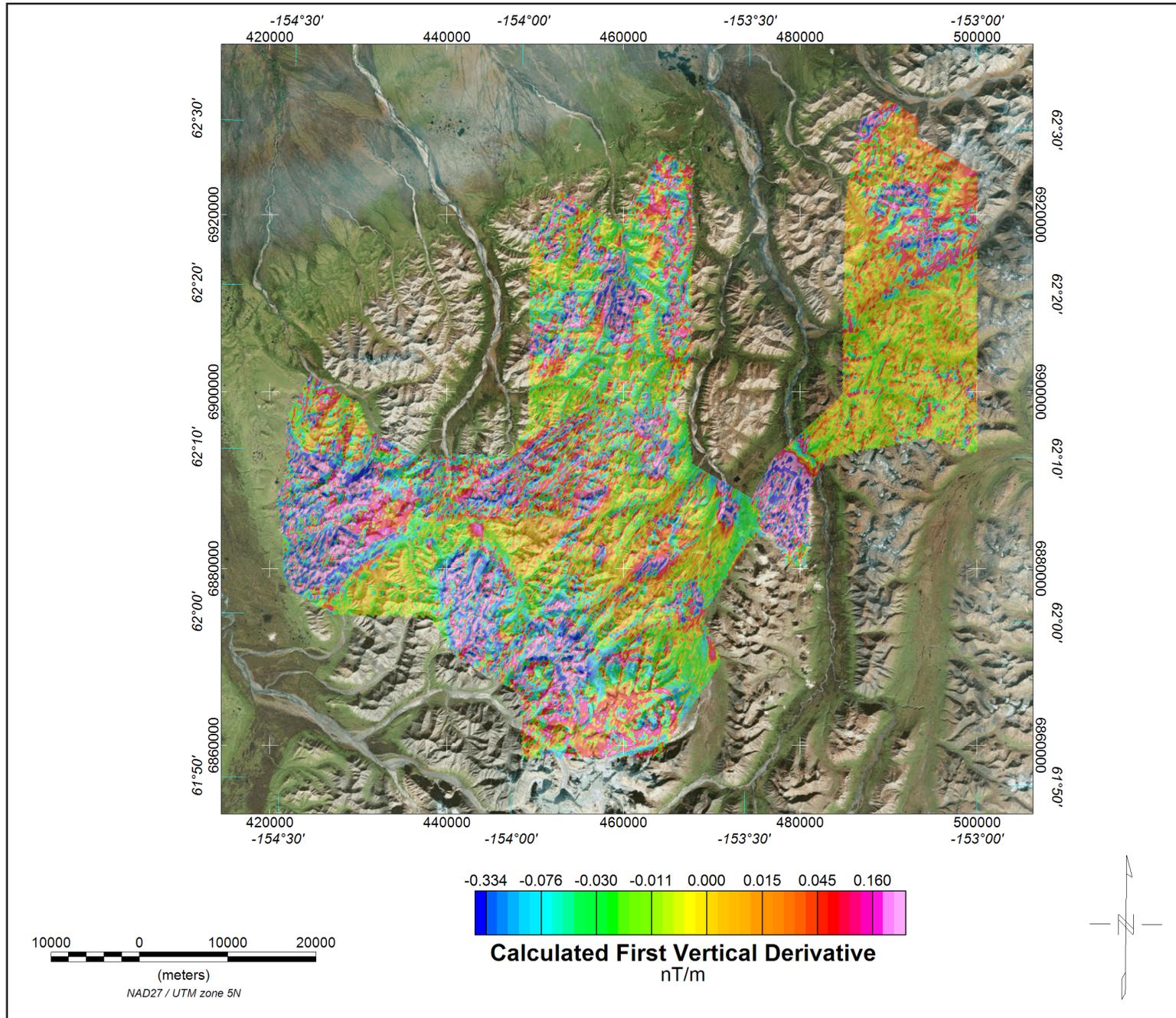


Figure 5. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units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

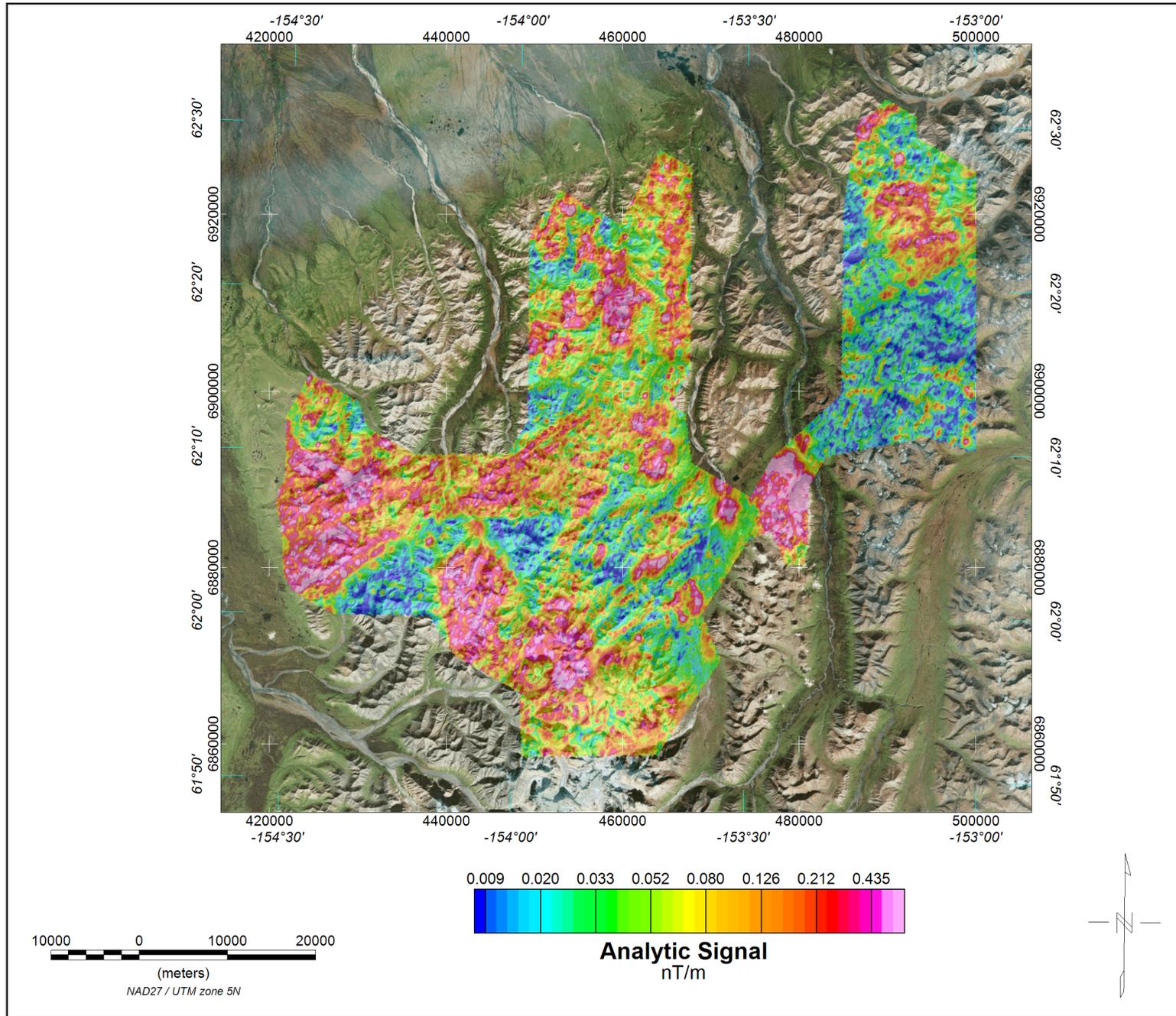


Figure 6. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, 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.

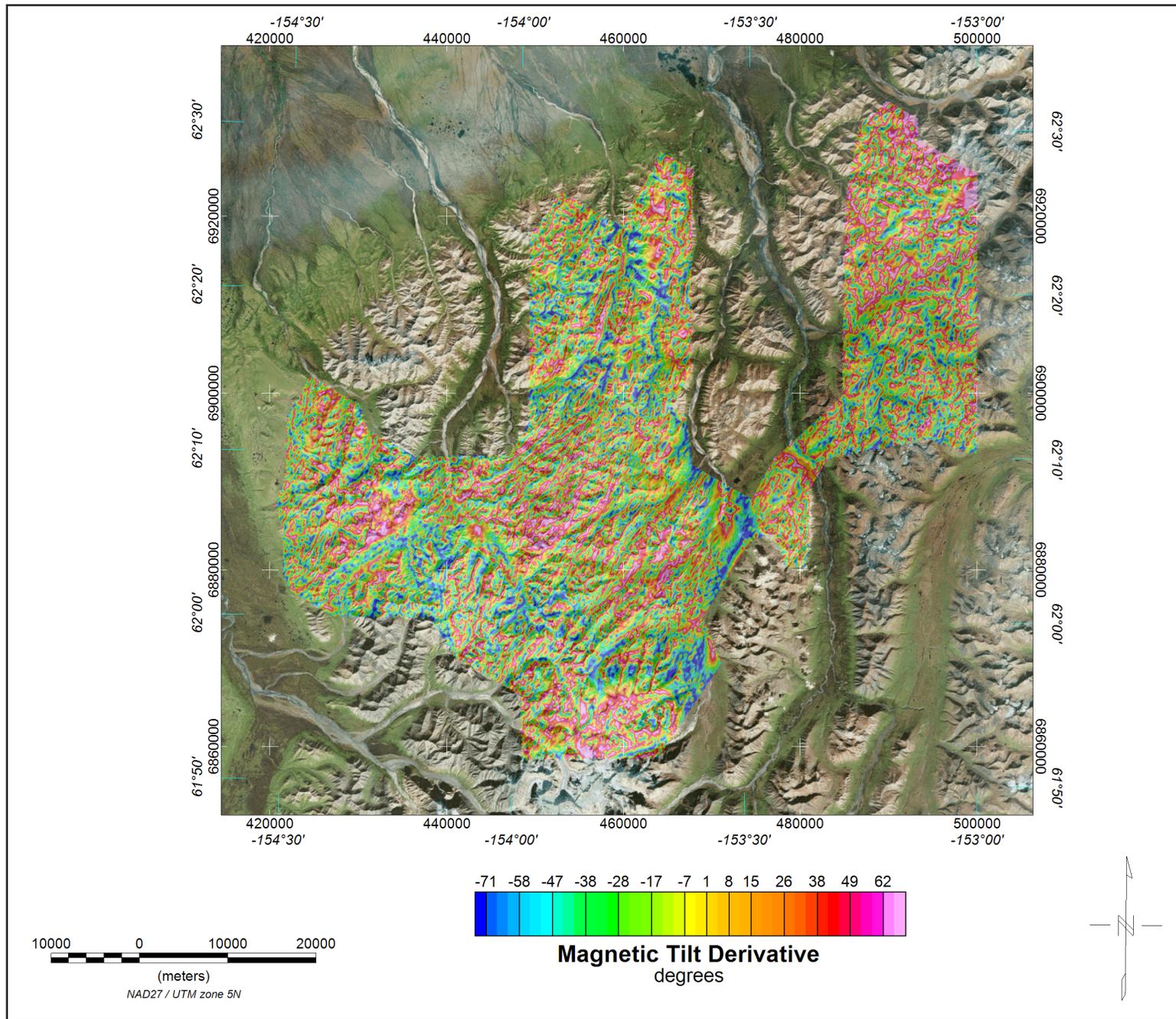


Figure 7. The tilt derivative is the angle between the horizontal gradient and the total gradient, which is useful for identifying the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the 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.

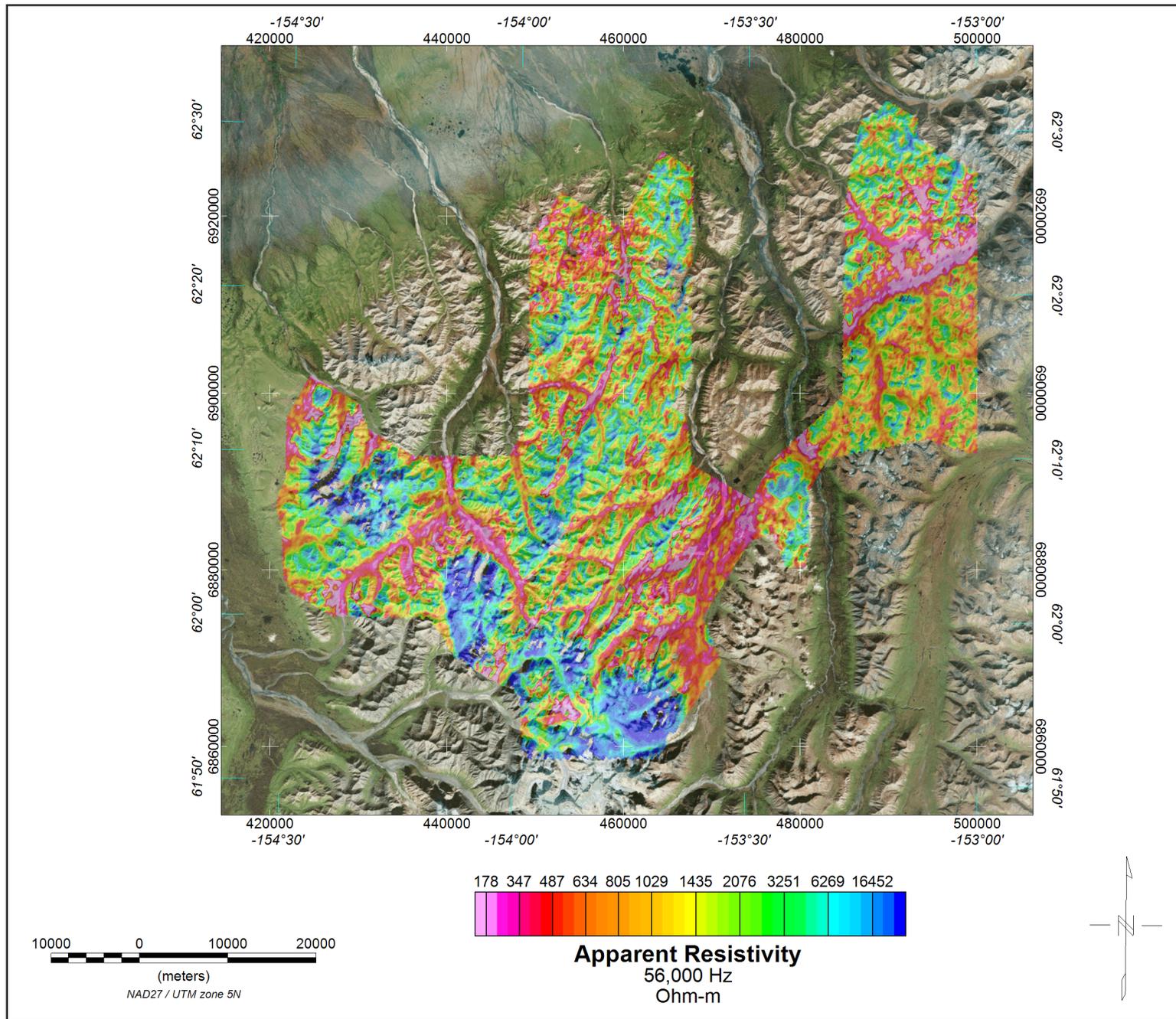


Figure 8. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds 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.

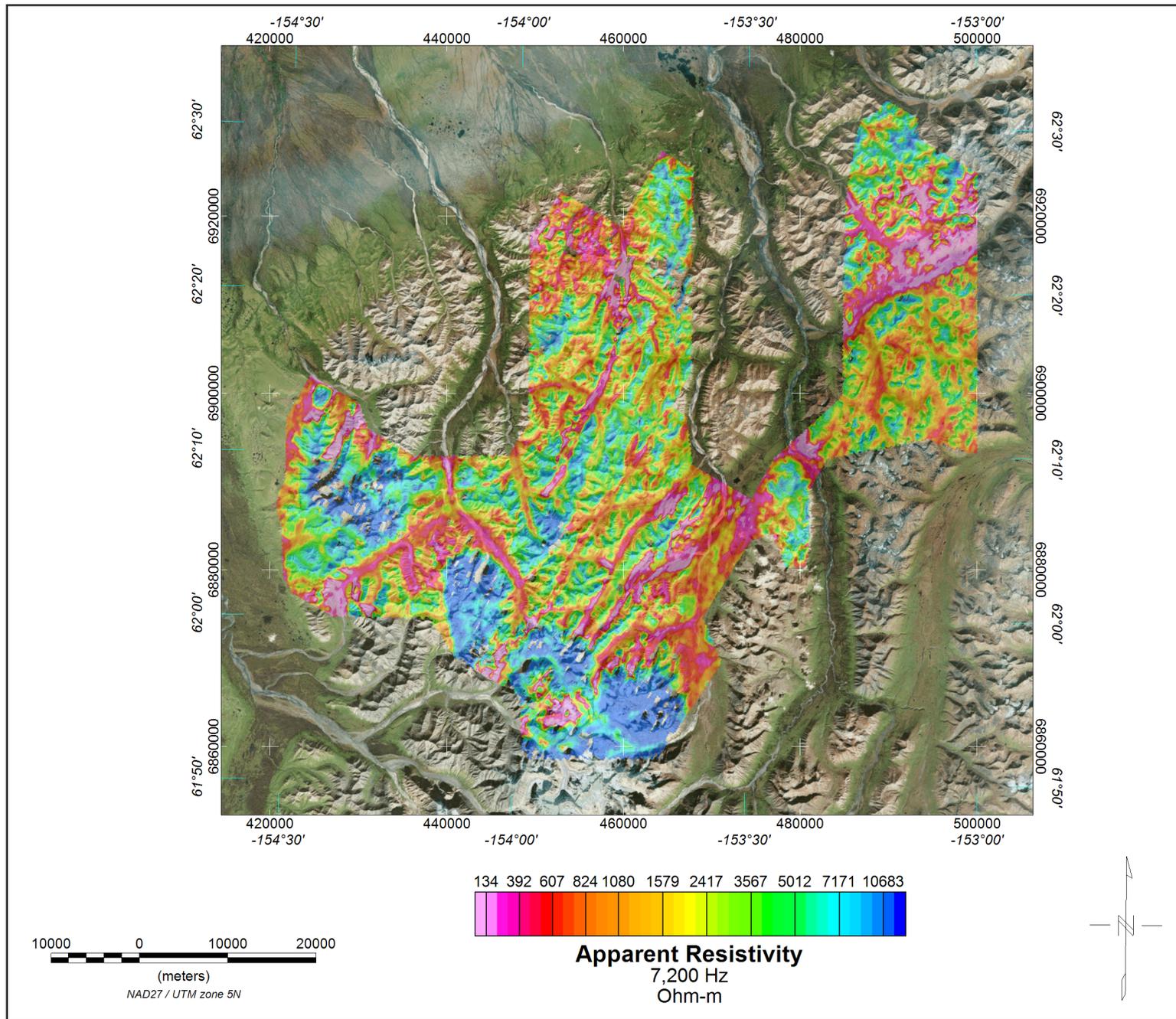


Figure 9. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds 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.

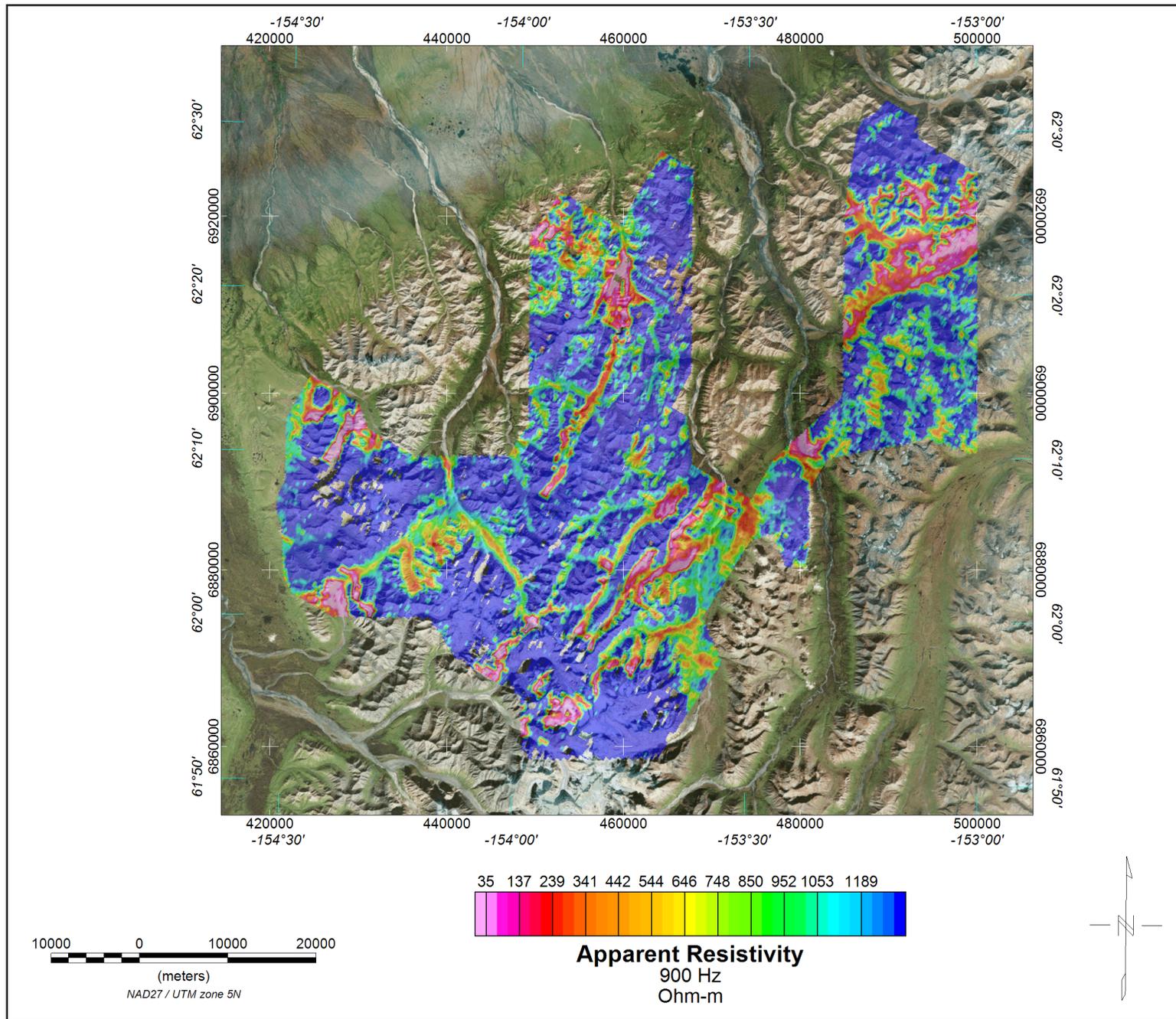


Figure 10. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system 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.

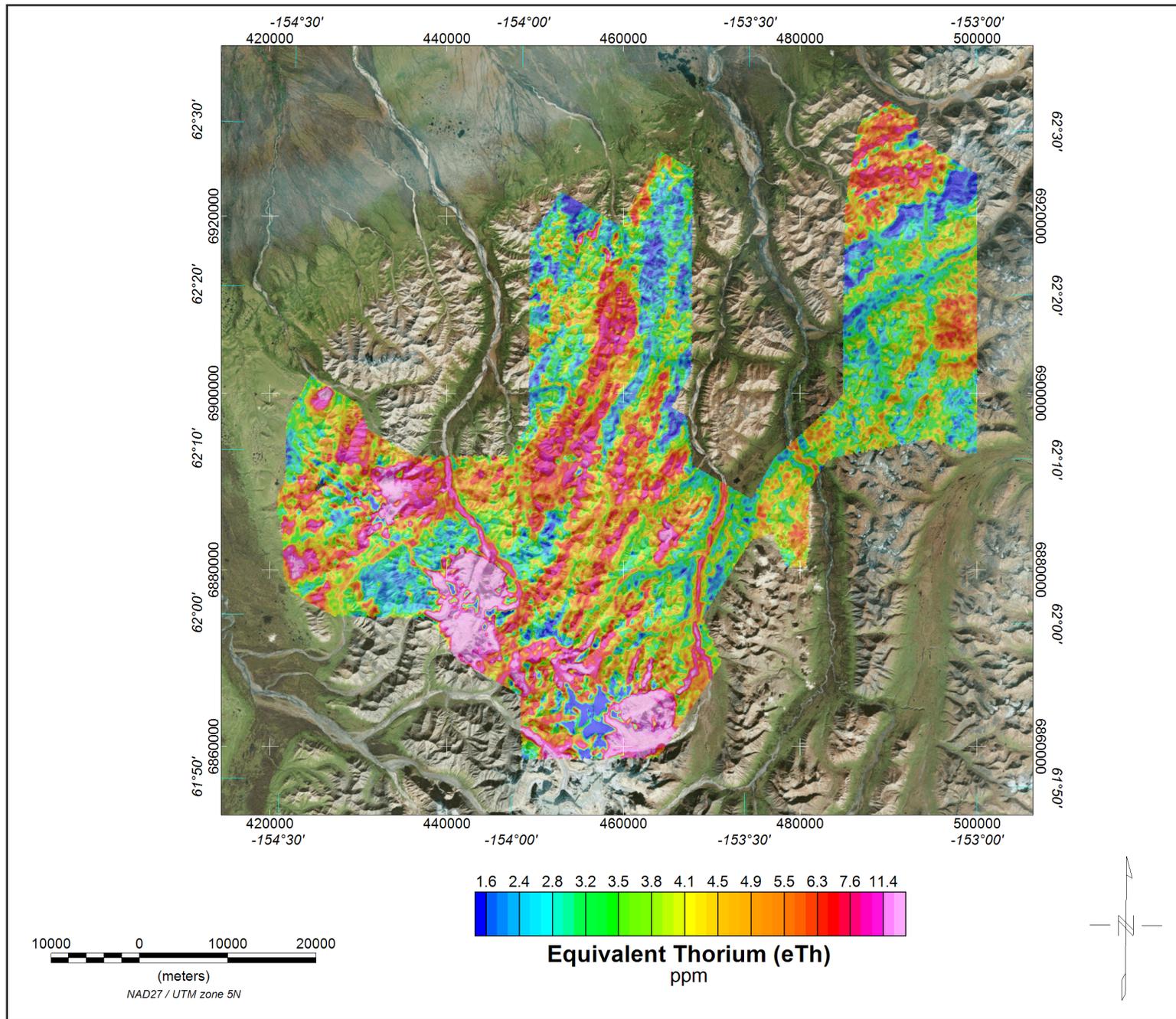


Figure 11. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

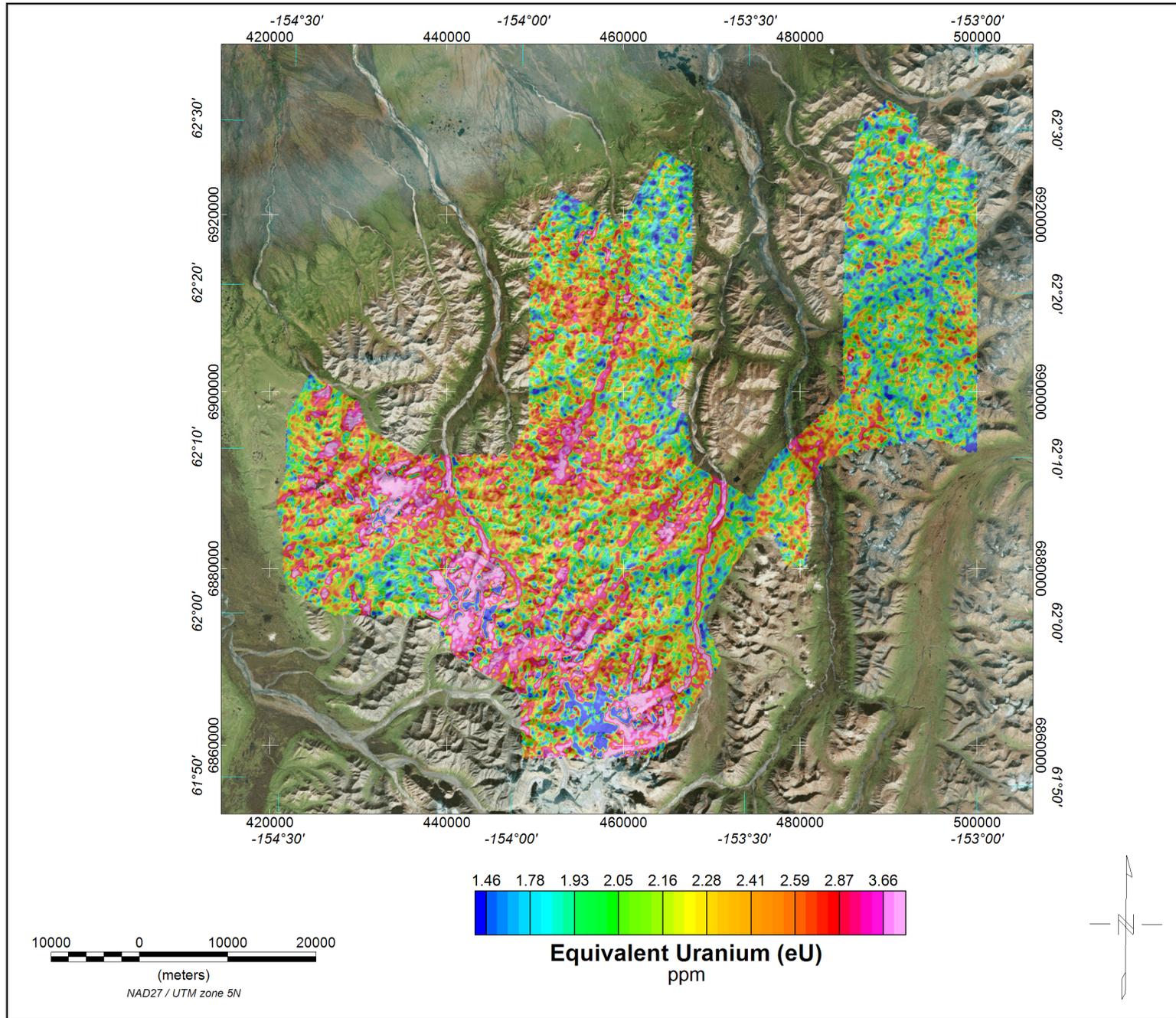


Figure 12. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

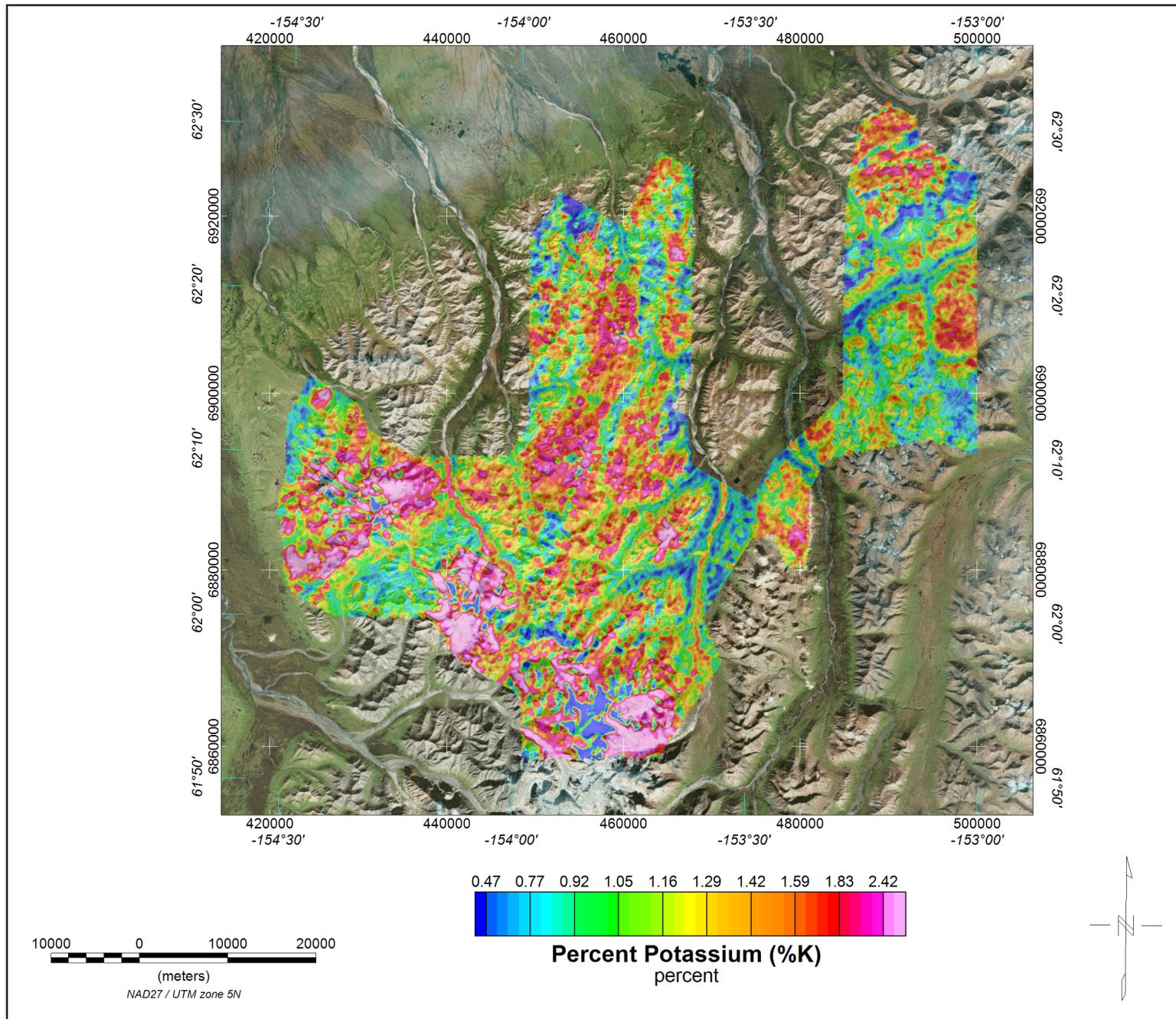


Figure 13. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

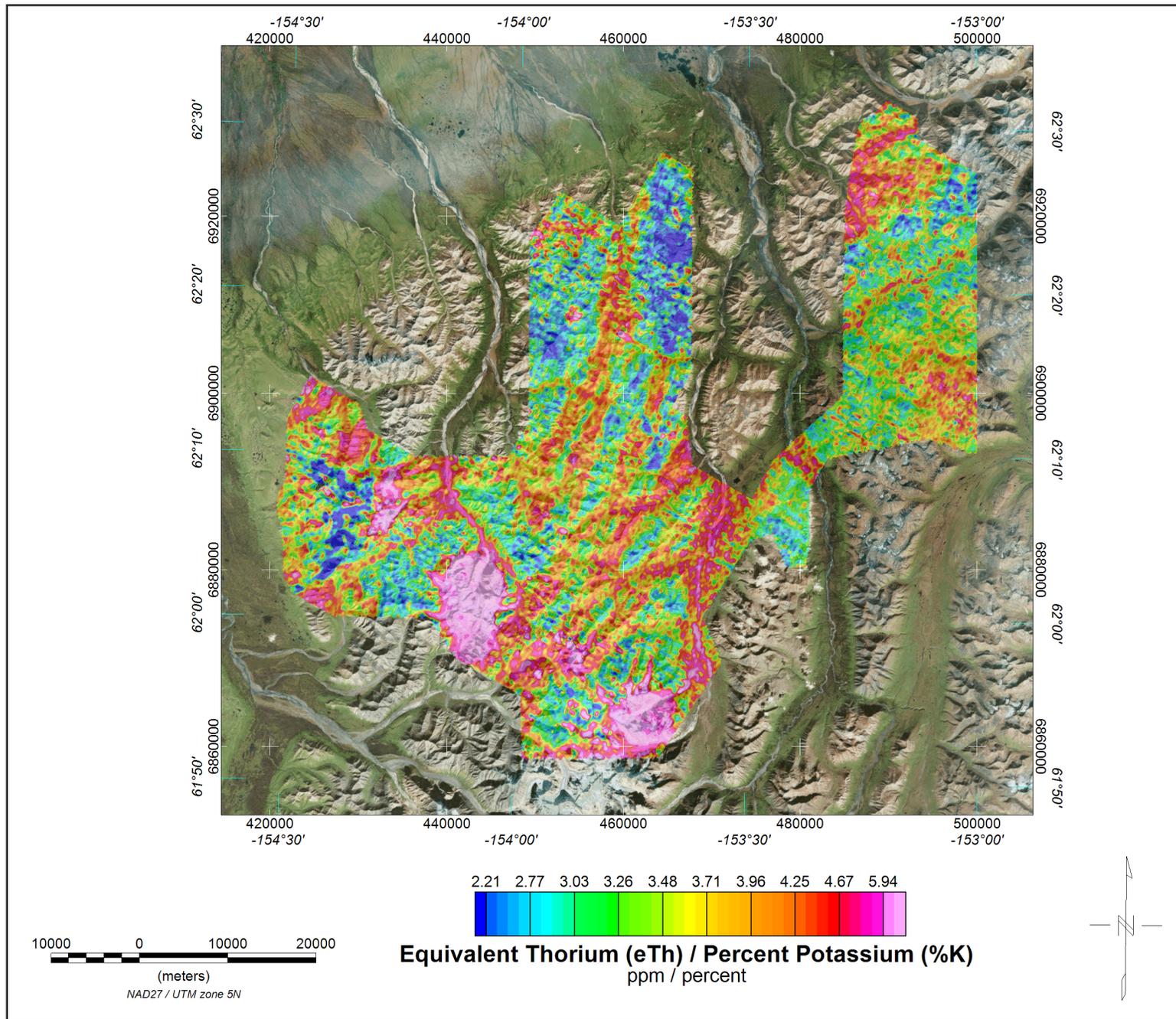


Figure 14. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

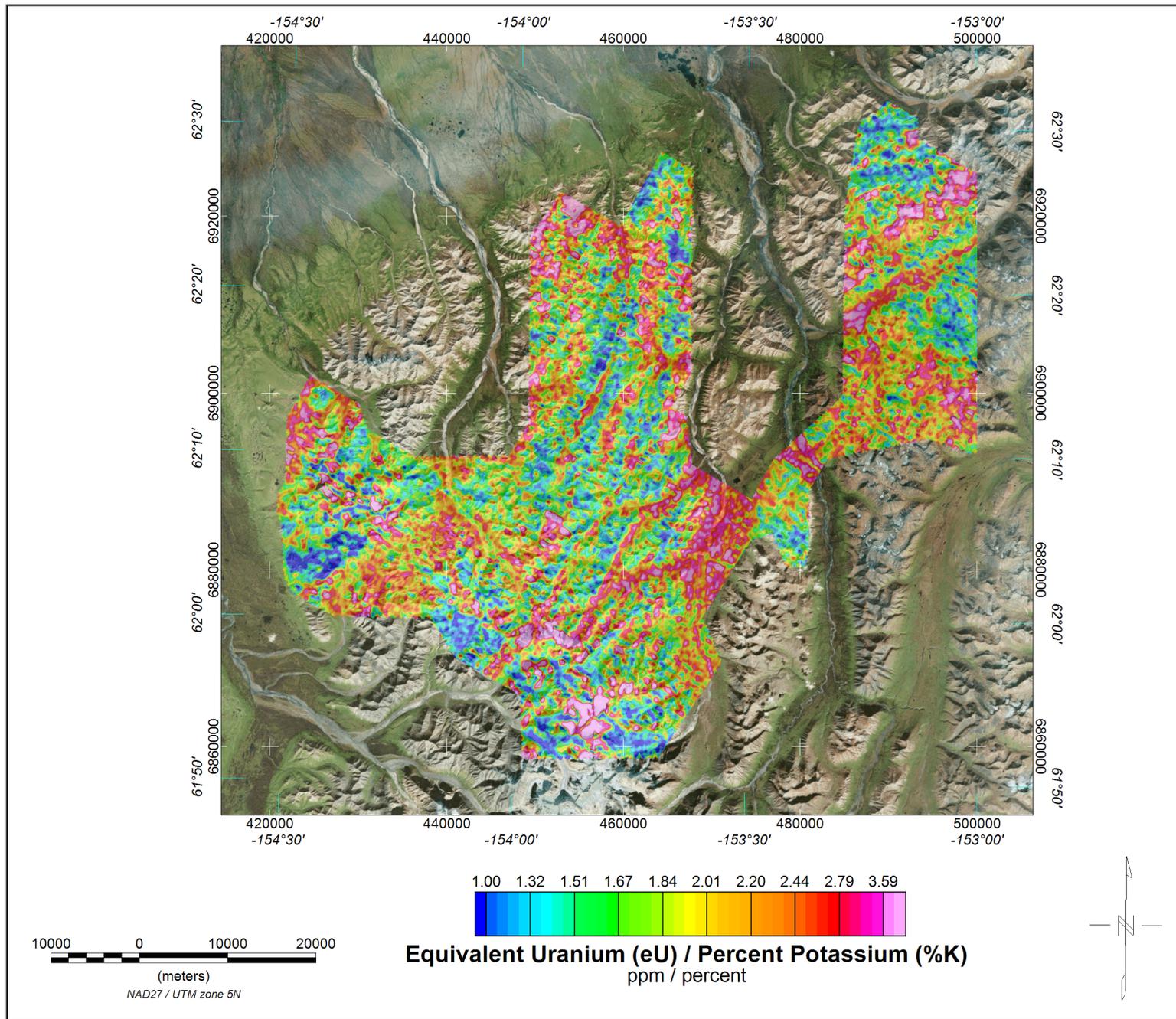


Figure 15. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

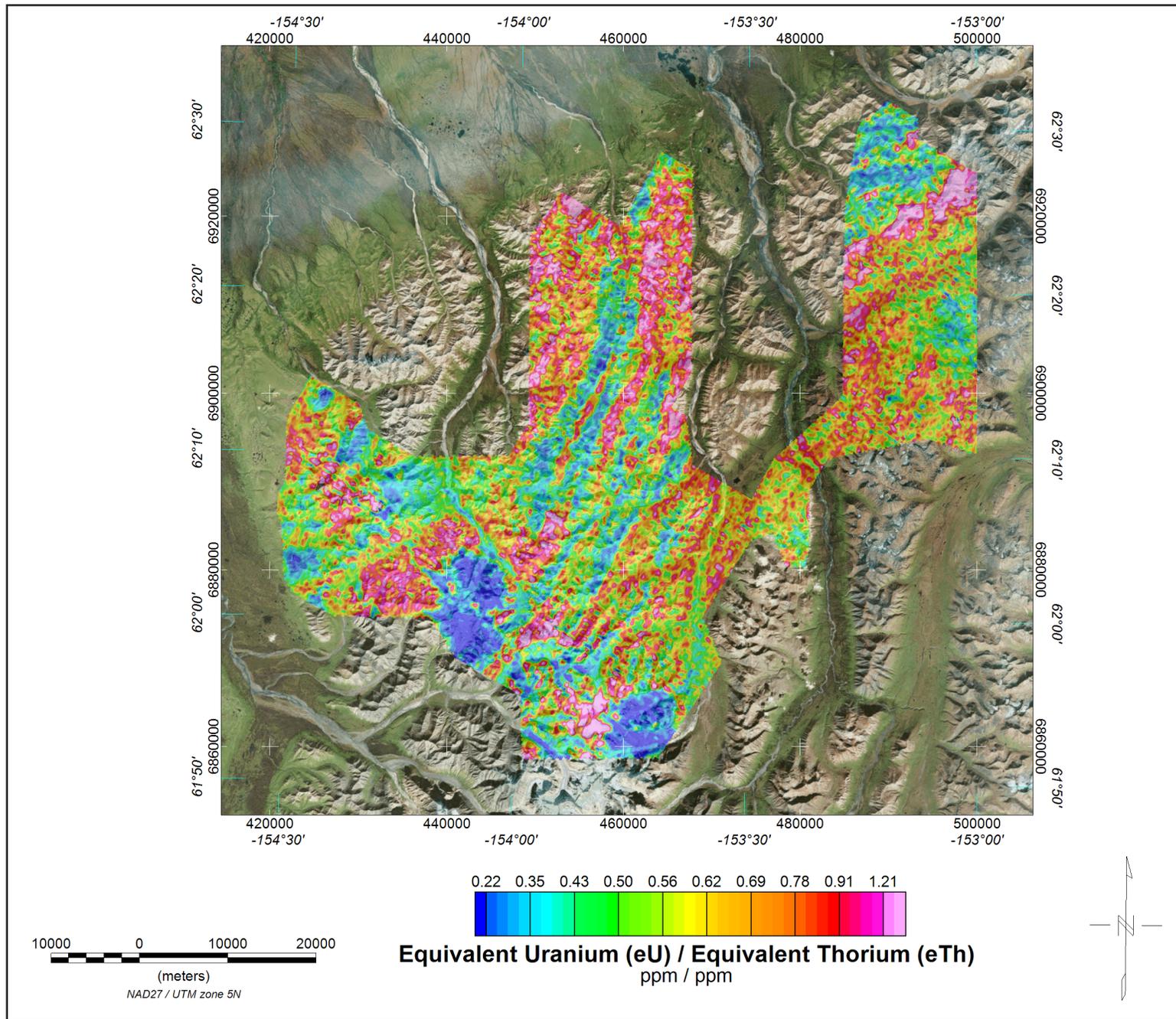


Figure 16. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

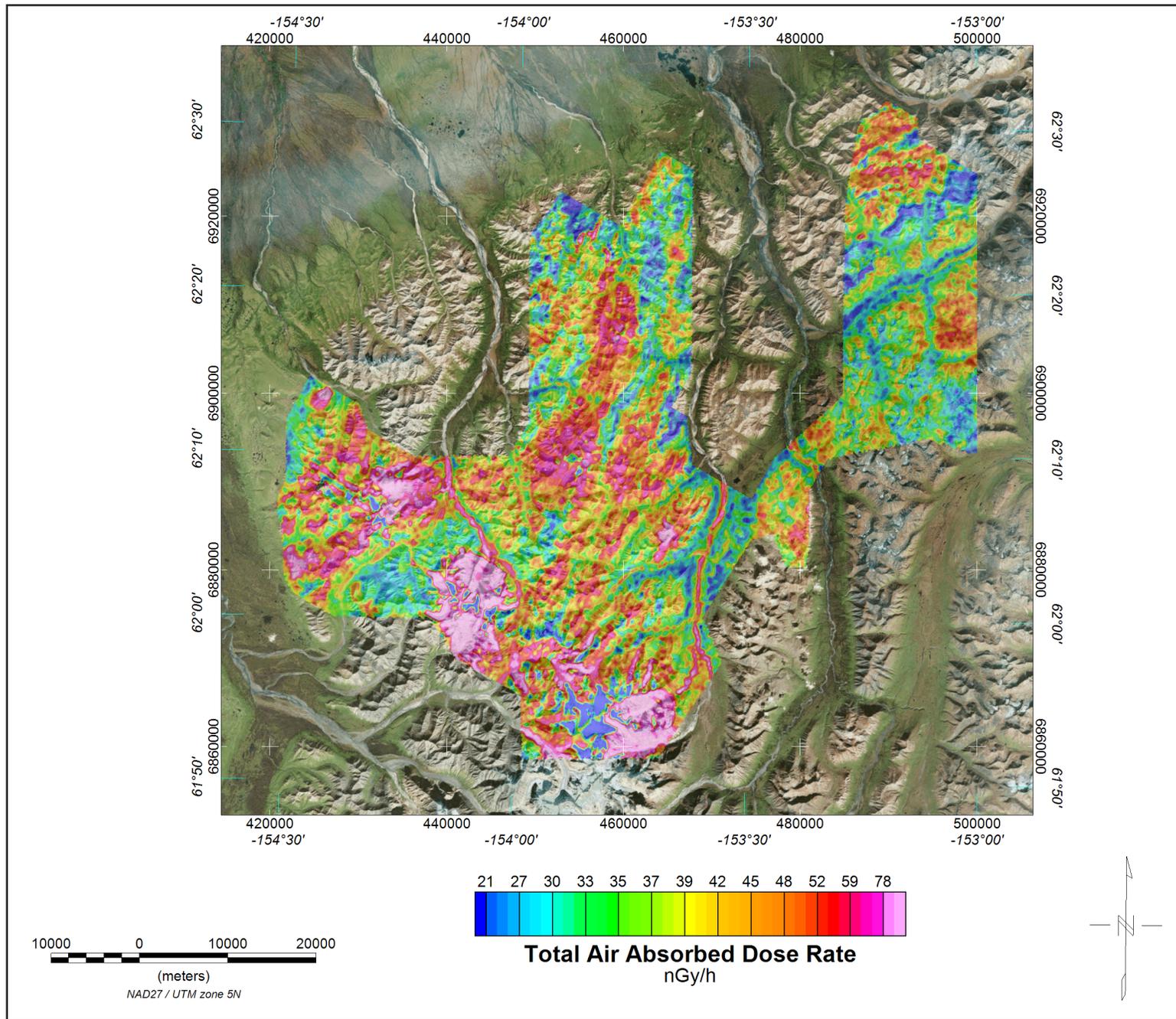


Figure 17. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature 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/10.14509/30190>.

Map Title	Description
farewell_flightpath_topo_map_1of4.pdf	flightpath grid with topographic base map
farewell_flightpath_topo_map_2of4.pdf	flightpath grid with topographic base map
farewell_flightpath_topo_map_3of4.pdf	flightpath grid with topographic base map
farewell_flightpath_topo_map_4of4.pdf	flightpath grid with topographic base map
farewell_residualmag_topo_map_1of4.pdf	residual magnetic intensity grid with topographic base map
farewell_residualmag_topo_map_2of4.pdf	residual magnetic intensity grid with topographic base map
farewell_residualmag_topo_map_3of4.pdf	residual magnetic intensity grid with topographic base map
farewell_residualmag_topo_map_4of4.pdf	residual magnetic intensity grid with topographic base map
farewell_residualmag_contours_plss_map_1of4.pdf	residual magnetic intensity grid and contours with public land survey system base layer
farewell_residualmag_contours_plss_map_2of4.pdf	residual magnetic intensity grid and contours with public land survey system base layer
farewell_residualmag_contours_plss_map_3of4.pdf	residual magnetic intensity grid and contours with public land survey system base layer
farewell_residualmag_contours_plss_map_4of4.pdf	residual magnetic intensity grid and contours with public land survey system base layer
farewell_analyticssignal_topo_map_1of4.pdf	magnetic analytic signal grid with topographic base map
farewell_analyticssignal_topo_map_2of4.pdf	magnetic analytic signal grid with topographic base map
farewell_analyticssignal_topo_map_3of4.pdf	magnetic analytic signal grid with topographic base map
farewell_analyticssignal_topo_map_4of4.pdf	magnetic analytic signal grid with topographic base map
farewell_analyticssignal_contours_plss_map_1of4.pdf	magnetic analytic signal grid and contours with public land survey system base layer
farewell_analyticssignal_contours_plss_map_2of4.pdf	magnetic analytic signal grid and contours with public land survey system base layer
farewell_analyticssignal_contours_plss_map_3of4.pdf	magnetic analytic signal grid and contours with public land survey system base layer
farewell_analyticssignal_contours_plss_map_4of4.pdf	magnetic analytic signal grid and contours with public land survey system base layer
farewell_calculated1vd_topo_map_1of4.pdf	magnetic calculated first vertical derivative grid with topographic base map
farewell_calculated1vd_topo_map_2of4.pdf	magnetic calculated first vertical derivative grid with topographic base map
farewell_calculated1vd_topo_map_3of4.pdf	magnetic calculated first vertical derivative grid with topographic base map
farewell_calculated1vd_topo_map_4of4.pdf	magnetic calculated first vertical derivative grid with topographic base map
farewell_tiltderivative_contours_topo_map_1of4.pdf	magnetic tiltderivative grid and contours with topographic base map
farewell_tiltderivative_contours_topo_map_2of4.pdf	magnetic tiltderivative grid and contours with topographic base map
farewell_tiltderivative_contours_topo_map_3of4.pdf	magnetic tiltderivative grid and contours with topographic base map
farewell_tiltderivative_contours_topo_map_4of4.pdf	magnetic tiltderivative grid and contours with topographic base map
farewell_residualmag_shaded_tiltderivative_contours_topo_map_1of4.pdf	residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map

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/10.14509/30190>.

Map Title	Description
farewell_residualmag_shaded_tiltderivative_contours_topo_map_2of4.pdf	residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map
farewell_residualmag_shaded_tiltderivative_contours_topo_map_3of4.pdf	residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map
farewell_residualmag_shaded_tiltderivative_contours_topo_map_4of4.pdf	residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map
farewell_res56khz_topo_map_1of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
farewell_res56khz_topo_map_2of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
farewell_res56khz_topo_map_3of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
farewell_res56khz_topo_map_4of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
farewell_res56khz_contours_plss_map_1of4.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res56khz_contours_plss_map_2of4.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res56khz_contours_plss_map_3of4.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res56khz_contours_plss_map_4of4.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res7200hz_topo_map_1of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
farewell_res7200hz_topo_map_2of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
farewell_res7200hz_topo_map_3of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
farewell_res7200hz_topo_map_4of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
farewell_res7200hz_contours_plss_map_1of4.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res7200hz_contours_plss_map_2of4.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res7200hz_contours_plss_map_3of4.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res7200hz_contours_plss_map_4of4.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
farewell_res900hz_topo_map_1of4.pdf	900 Hz apparent resistivity grid with topographic base map
farewell_res900hz_topo_map_2of4.pdf	900 Hz apparent resistivity grid with topographic base map
farewell_res900hz_topo_map_3of4.pdf	900 Hz apparent resistivity grid with topographic base map
farewell_res900hz_topo_map_4of4.pdf	900 Hz apparent resistivity grid with topographic base map
farewell_res900hz_contours_plss_map_1of4.pdf	900 Hz apparent resistivity grid and contours with public land survey system grid
farewell_res900hz_contours_plss_map_2of4.pdf	900 Hz apparent resistivity grid and contours with public land survey system grid
farewell_res900hz_contours_plss_map_3of4.pdf	900 Hz apparent resistivity grid and contours with public land survey system grid
farewell_res900hz_contours_plss_map_4of4.pdf	900 Hz apparent resistivity grid and contours with public land survey system grid
farewell_rad_ratio_th_k_topo_map_1of4.pdf	equivalent thorium percent potassium ratio grid with topographic base map
farewell_rad_ratio_th_k_topo_map_2of4.pdf	equivalent thorium percent potassium ratio grid with topographic base map
farewell_rad_ratio_th_k_topo_map_3of4.pdf	equivalent thorium percent potassium ratio grid with topographic base map

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/10.14509/30190>.

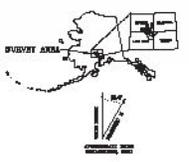
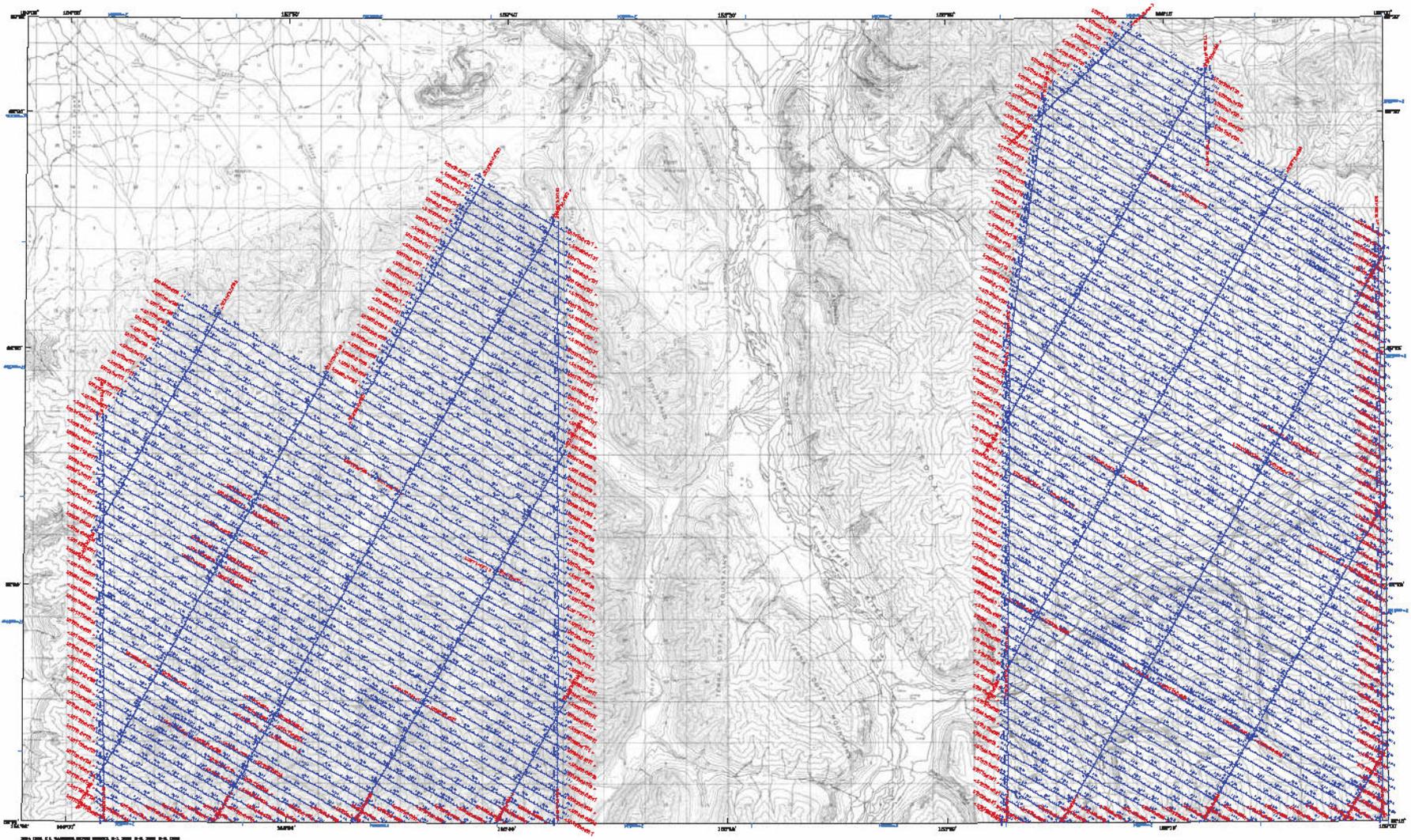
Map Title	Description
farewell_rad_ratio_th_k_topo_map_4of4.pdf	equivalent thorium percent potassium ratio grid with topographic base map
farewell_rad_ratio_th_k_contours_plss_map_1of4.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_th_k_contours_plss_map_2of4.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_th_k_contours_plss_map_3of4.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_th_k_contours_plss_map_4of4.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_k_topo_map_1of4.pdf	equivalent uranium percent potassium ratio grid with topographic base map
farewell_rad_ratio_u_k_topo_map_2of4.pdf	equivalent uranium percent potassium ratio grid with topographic base map
farewell_rad_ratio_u_k_topo_map_3of4.pdf	equivalent uranium percent potassium ratio grid with topographic base map
farewell_rad_ratio_u_k_topo_map_4of4.pdf	equivalent uranium percent potassium ratio grid with topographic base map
farewell_rad_ratio_u_k_contours_plss_map_1of4.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_k_contours_plss_map_2of4.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_k_contours_plss_map_3of4.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_k_contours_plss_map_4of4.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_th_topo_map_1of4.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
farewell_rad_ratio_u_th_topo_map_2of4.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
farewell_rad_ratio_u_th_topo_map_3of4.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
farewell_rad_ratio_u_th_topo_map_4of4.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
farewell_rad_ratio_u_th_contours_plss_map_1of4.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_th_contours_plss_map_2of4.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_th_contours_plss_map_3of4.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
farewell_rad_ratio_u_th_contours_plss_map_4of4.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
farewell_rad_pct_k_topo_map_1of4.pdf	percent potassium grid with topographic base map
farewell_rad_pct_k_topo_map_2of4.pdf	percent potassium grid with topographic base map
farewell_rad_pct_k_topo_map_3of4.pdf	percent potassium grid with topographic base map
farewell_rad_pct_k_topo_map_4of4.pdf	percent potassium grid with topographic base map
farewell_rad_pct_k_contours_plss_map_1of4.pdf	percent potassium grid and contours with public land survey system base layer
farewell_rad_pct_k_contours_plss_map_2of4.pdf	percent potassium grid and contours with public land survey system base layer
farewell_rad_pct_k_contours_plss_map_3of4.pdf	percent potassium grid and contours with public land survey system base layer
farewell_rad_pct_k_contours_plss_map_4of4.pdf	percent potassium grid and contours with public land survey system base layer
farewell_rad_equiv_th_topo_map_1of4.pdf	equivalent thorium grid with topographic base map

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/10.14509/30190>.

Map Title	Description
farewell_rad_equiv_th_topo_map_2of4.pdf	equivalent thorium grid with topographic base map
farewell_rad_equiv_th_topo_map_3of4.pdf	equivalent thorium grid with topographic base map
farewell_rad_equiv_th_topo_map_4of4.pdf	equivalent thorium grid with topographic base map
farewell_rad_equiv_th_contours_plss_map_1of4.pdf	equivalent thorium grid and contours with public land survey system base layer
farewell_rad_equiv_th_contours_plss_map_2of4.pdf	equivalent thorium grid and contours with public land survey system base layer
farewell_rad_equiv_th_contours_plss_map_3of4.pdf	equivalent thorium grid and contours with public land survey system base layer
farewell_rad_equiv_th_contours_plss_map_4of4.pdf	equivalent thorium grid and contours with public land survey system base layer
farewell_rad_equiv_u_topo_map_1of4.pdf	equivalent uranium grid with topographic base map
farewell_rad_equiv_u_topo_map_2of4.pdf	equivalent uranium grid with topographic base map
farewell_rad_equiv_u_topo_map_3of4.pdf	equivalent uranium grid with topographic base map
farewell_rad_equiv_u_topo_map_4of4.pdf	equivalent uranium grid with topographic base map
farewell_rad_equiv_u_contours_plss_map_1of4.pdf	equivalent uranium grid and contours with public land survey system base layer
farewell_rad_equiv_u_contours_plss_map_2of4.pdf	equivalent uranium grid and contours with public land survey system base layer
farewell_rad_equiv_u_contours_plss_map_3of4.pdf	equivalent uranium grid and contours with public land survey system base layer
farewell_rad_equiv_u_contours_plss_map_4of4.pdf	equivalent uranium grid and contours with public land survey system base layer
farewell_rad_tadr_topo_map_1of4.pdf	total air absorbed dose rate grid with topographic base map
farewell_rad_tadr_topo_map_2of4.pdf	total air absorbed dose rate grid with topographic base map
farewell_rad_tadr_topo_map_3of4.pdf	total air absorbed dose rate grid with topographic base map
farewell_rad_tadr_topo_map_4of4.pdf	total air absorbed dose rate grid with topographic base map
farewell_rad_tadr_contours_plss_map_1of4.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
farewell_rad_tadr_contours_plss_map_2of4.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
farewell_rad_tadr_contours_plss_map_3of4.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
farewell_rad_tadr_contours_plss_map_4of4.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
farewell_rad_ternary_topo_map_1of4.pdf	radioelement ternary grid with topographic base map
farewell_rad_ternary_topo_map_2of4.pdf	radioelement ternary grid with topographic base map
farewell_rad_ternary_topo_map_3of4.pdf	radioelement ternary grid with topographic base map
farewell_rad_ternary_topo_map_4of4.pdf	radioelement ternary grid with topographic base map
farewell_interpretation_plss_map_1of5.pdf	interpretation with public land survey system base layer
farewell_interpretation_plss_map_2of5.pdf	interpretation with public land survey system base layer
farewell_interpretation_plss_map_3of5.pdf	interpretation with public land survey system base layer

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/10.14509/30190>.

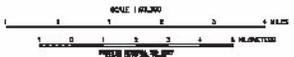
Map Title	Description
farewell_interpretation_plss_map_4of5.pdf	interpretation with public land survey system base layer
farewell_interpretation_plss_map_5of5.pdf	interpretation with public land survey system base layer
farewell_interpretation_residualmag_plss_map_1of5.pdf	interpretation and residual magnetic intensity grid with public land survey system base layer
farewell_interpretation_residualmag_plss_map_2of5.pdf	interpretation and residual magnetic intensity grid with public land survey system base layer
farewell_interpretation_residualmag_plss_map_3of5.pdf	interpretation and residual magnetic intensity grid with public land survey system base layer
farewell_interpretation_residualmag_plss_map_4of5.pdf	interpretation and residual magnetic intensity grid with public land survey system base layer
farewell_interpretation_residualmag_plss_map_5of5.pdf	interpretation and residual magnetic intensity grid with public land survey system base layer
farewell_emanomalies_residualmag_detailed_topo_map1of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map2of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map3of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map4of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map5of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map6of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map7of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map8of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map9of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map
farewell_emanomalies_residualmag_detailed_topo_map10of10.pdf	em anomalies and residual magnetic intensity grid with topographic base map



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro OTC-100 magnetometer with a bottom 200 ocean sensor, and a Fugro SVP-100 100-2000 streamer-type system. Some flights acquired the resistivity data with an Explorer-60-200 system. The EM and magnetometer surveys were flown at a height of 200 feet, in addition to the survey (topographic data) from 1000 feet. All data were collected during the same flight. The magnetometer and resistivity surveys were performed with an 80-200-33 streamer type system at a mean terrain clearance of 200 feet along the EM (EM) survey flight lines with a spacing of a quarter of a mile. The flow were flown perpendicular to the flight line at intervals of approximately 3 miles.

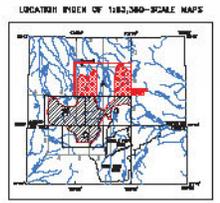
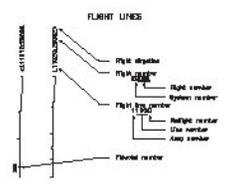
A Fugro OTC-100, OTC-100 Magnetometer System was used for navigation. The navigation system was a dual GPS system using a multi-antenna configuration to a relative accuracy of better than 3 m. Digital elevation data were projected onto the same UTM zone 50 eastward, 1983 North American datum using a datum conversion (10' of 10') a north-south of 0 and an east-west of 20,000. Horizontal accuracy of the projected data is better than 10 m with respect to the UTM grid.



FLIGHT PATH WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

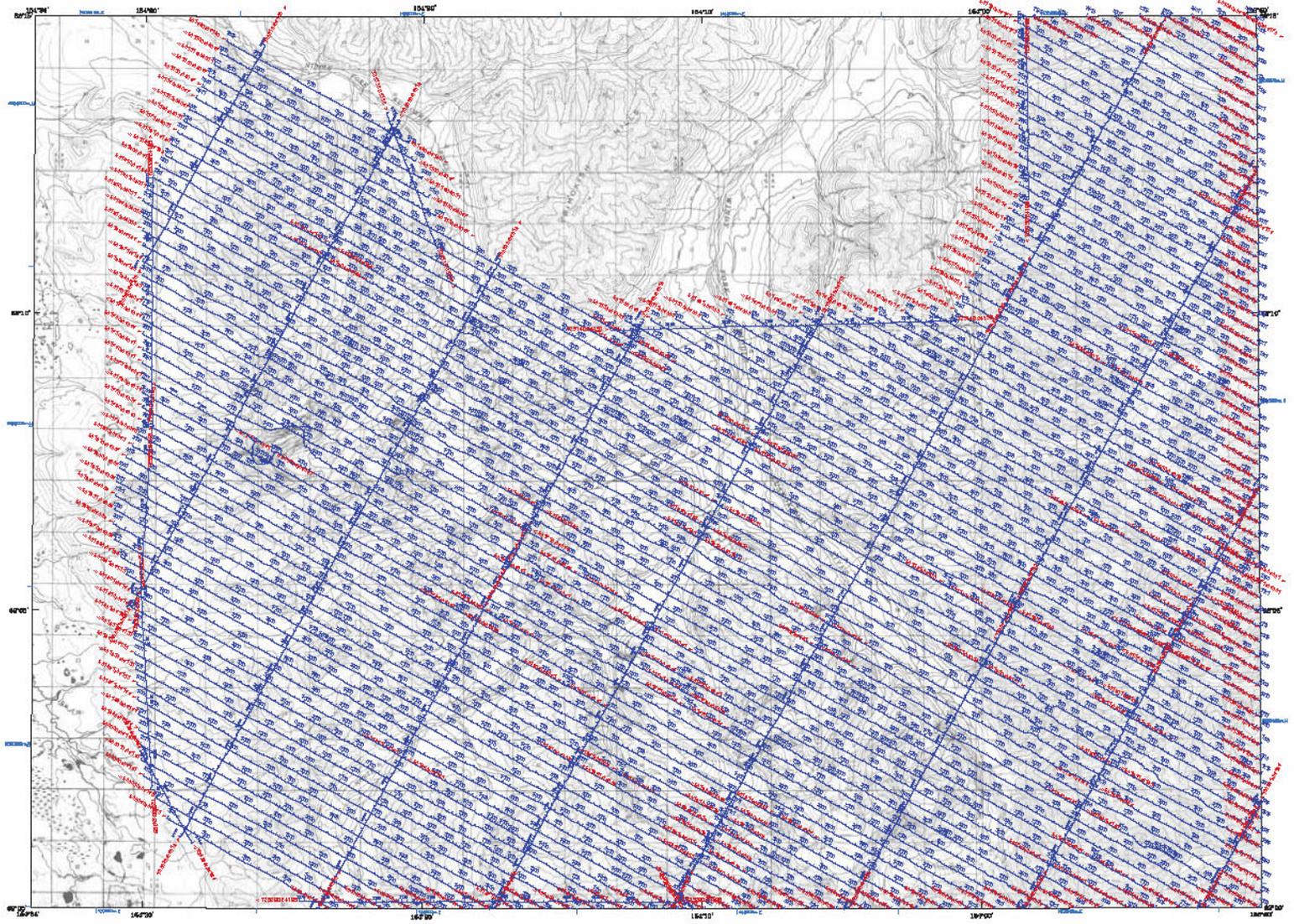
by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014



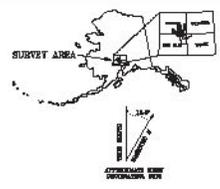
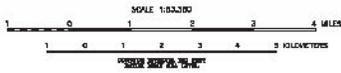
SURVEY HISTORY

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 Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. Previous data were CGGS airborne geophysical data from the current survey are shown in the location map. Digital elevation data were acquired and processed by the Alaska State Department of Natural Resources and Geophysical Surveying, which is part of the Alaska Airborne Geophysical and Geophysical Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the survey.

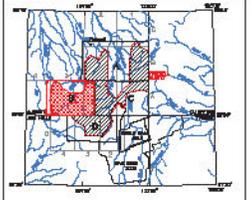
All data and maps produced to date from this survey are available in digital format on DVD for a central fee through DGGS, 3304 Delores Road, Fairbanks, Alaska, 99701-0001, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/data). Maps are also available on paper through the DGGS office and on flexible disks of the maps in Adobe Acrobat PDF file format.



See also US Geological Survey sheets A-4, 1838, A-4, 1839, and A-4, 1841, Geographic Names.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



FLIGHT PATH WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

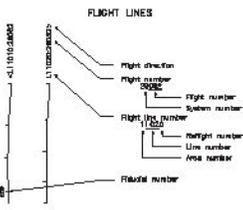
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DORNIER Electronics (EM) system, a Fugro D'Adda magnetometer with a Scripps 350 coil sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstar 25-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an Agusta-Bell Super Puma helicopter at a mean terrain clearance of 2500 feet along NW-SE (120°) 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.

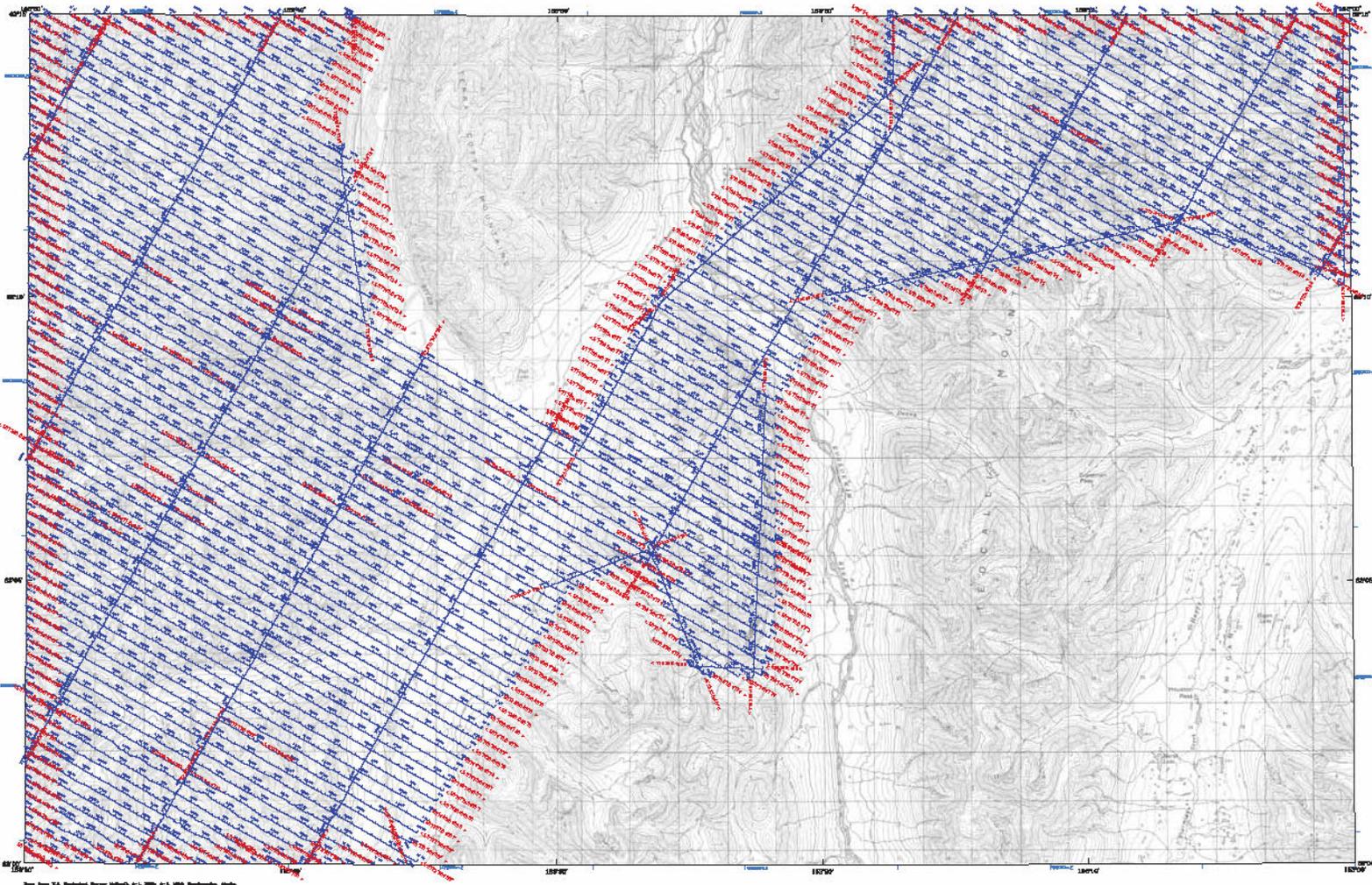
A Novatel OEM4-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 Merca datum datum using a central meridian (CM) of 152°, a north coordinate of 0 and an east constant of 600,000. Precision accuracy of the presented data is better than 10 m with respect to the UTM grid.



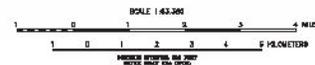
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. All Alaska geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Data were flown from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geological and Geophysical Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1364 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.



From: Bureau of Geographical Names, International Geographical Names Board, 1992.



**FLIGHT PATH
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Laural E. Burns, CGG, and Flugr Geoservices, Inc.
2014

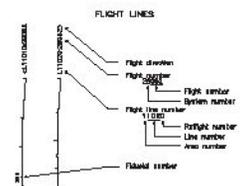
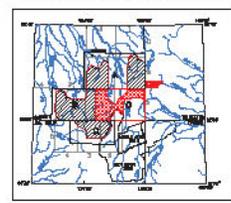


DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOTECH Electromagnetics (EM) system, a Flugr D1344 magnetometer with a battery pack system, and a Rodon Solutions RB-200 gamma-ray spectrometer. Each flight includes the reference dipole with an Explorerium EM-832 spectrometer. The EM and magnetometry systems were flown at a height of 100 ft. The gamma-ray spectrometers were flown at a height of 200 ft. In addition, the survey recorded data from radar and laser altimetry, and navigation systems, 30-second monitors and video cameras. Flights were performed with an AS-350B3 helicopter. Helicopter altitudes were maintained at a mean terrain clearance of 200 feet during EM-832 (100') survey flight times with a spacing of a quarter of a mile. The line was flown perpendicular to the flight lines at intervals of approximately 3 miles.

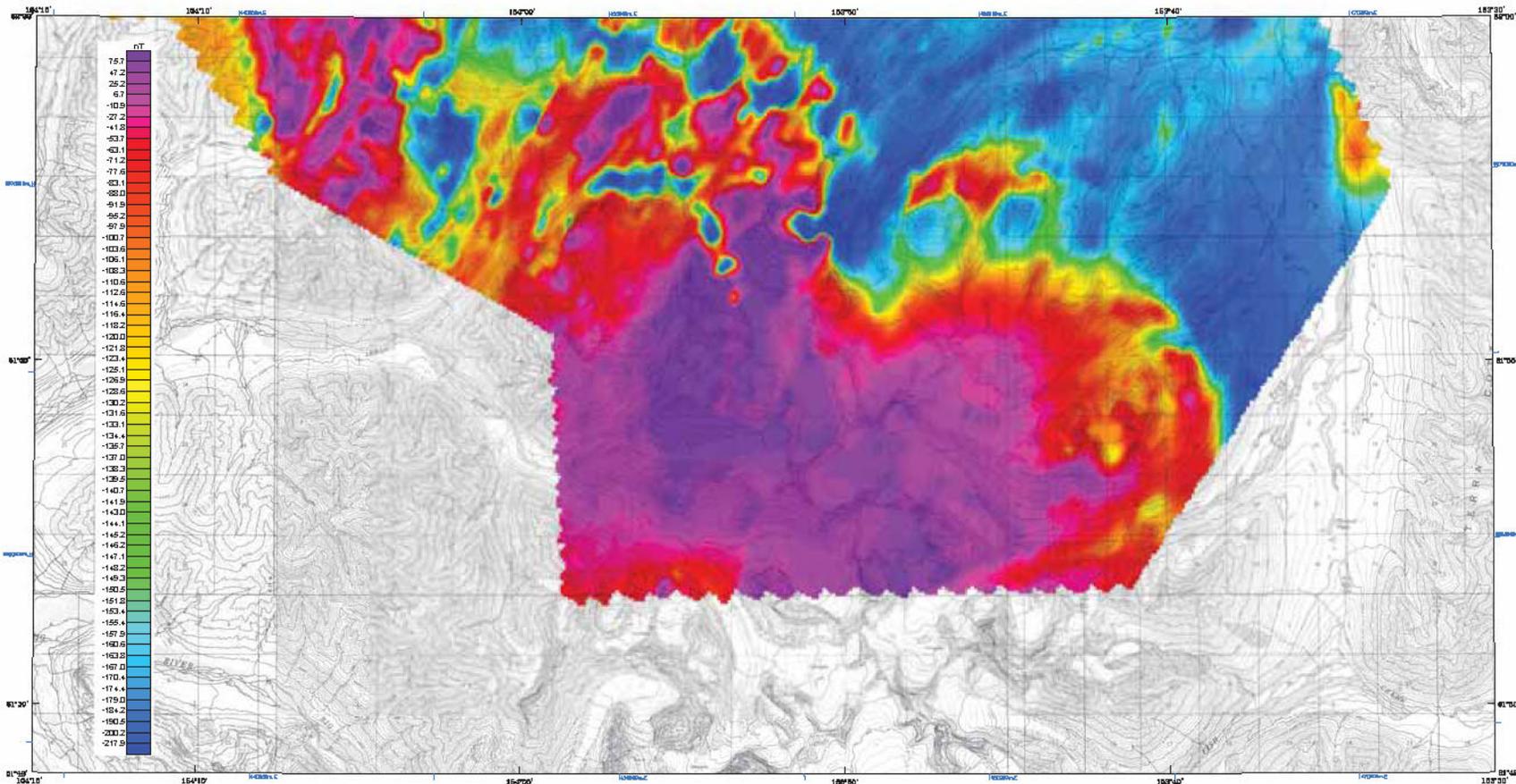
A Hatched DEMS-C21 Global Positioning System was used for navigation. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the China 1980 (UTM zone 5) spheroid, 1983 North American datum using a geoid model (G) of 1971, a north constant of 0 and an east constant of 268,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

LOCATION INDEX FOR 1:43,360-SCALE MAPS



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 Flugr Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Department as part of the Alaska Geologic and Geospatial Information Assessment project, which is part of the Alaska Airborne Geophysical and Geospatial Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work. All data and maps produced to date from this survey are available in digital format at DGG for a central file through CGG, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGG website (www.dgg.alaska.gov/geo/). Maps are also available on paper through the DGG office, and are available online at the website in Adobe Acrobat (.PDF) file format.



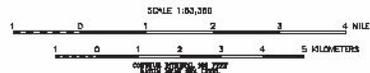
UNIT: METERS, DIMENSIONS: METERS, COORD. SYSTEM: UTM, P-S: NAD83, P-S: UTM, UTM ZONE: 18Q, UTM PROJECTION: UTM



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Spintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1/4-mile (120') 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152, a north constant of 0 and an oak constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.



RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

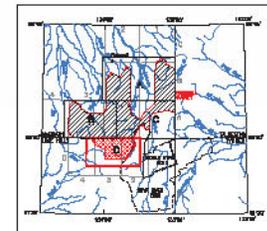
by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Spintrex 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) IGR corrected (IGR model 2010), updated for date of flight and altitude variations, (3) leveled to the tie line data, and (4) interpolated onto a regular 90 m grid using a modified Akima (1970) technique. All grids were then resampled from the 90 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alkins, 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. 848-852.

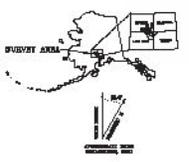
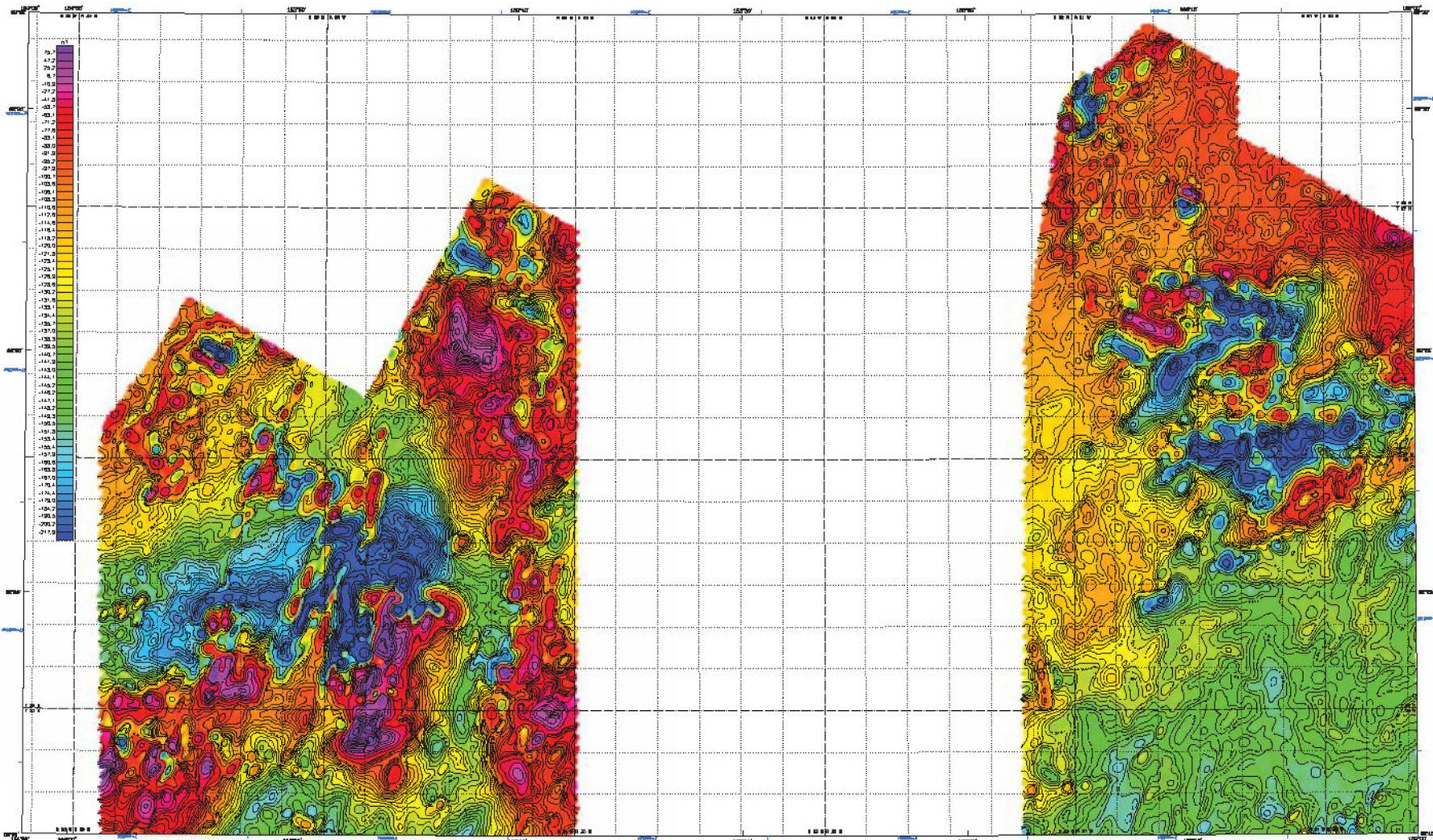
LOCATION INDEX FOR 1:63,560-SCALE MAPS



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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Dillinga 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.



DESCRIPTIVE NOTES

The geophysical data were acquired with a Geosoft Electromagnetic (EM) system, a Fugro D1344 magnetometer with a bottom 250 ocean sensor, and a Russian Belknap 100-200 geometry spectrometer. Some flights acquired the magnetic data with an Explorer EM-200 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The geometry spectrometers were flown at a height of 200 feet. In addition to the magnetic data, the Fugro D1344 also collected topographic data from a laser altimeter and a digital camera. The topographic data were collected at a range from 100 to 200 meters above the ground and at a resolution of 250 meters along the flight line. The topographic data were then used to correct the magnetic data for terrain effects. The magnetic data were then corrected for diurnal variations by subtracting the diurnal recorded base station magnetic data. The corrected data were then gridded to a 250 m grid. The gridded data were then filtered to a 250 m grid. The filtered data were then used to generate the magnetic contours. The magnetic contours were generated using a contour interval of 5 nT. The contours were then color-coded according to the legend on the left side of the map.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digital recorded data from a Fugro D1344 magnetometer with a bottom 250 ocean sensor. The magnetic data were (1) corrected for diurnal variations by subtracting the diurnal recorded base station magnetic data, (2) corrected for terrain effects, (3) gridded to a 250 m grid, and (4) filtered to a 250 m grid. The filtered data were then used to generate the magnetic contours. The magnetic contours were generated using a contour interval of 5 nT. The contours were then color-coded according to the legend on the left side of the map.

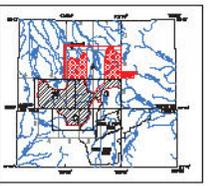
NOTE: A 1983 USGS profile of topographic and magnetic data for the area shown in this report is available from the USGS.



**RESIDUAL MAGNETIC FIELD
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014

LOCATION INDEX OF 1:50,000-SCALE MAPS

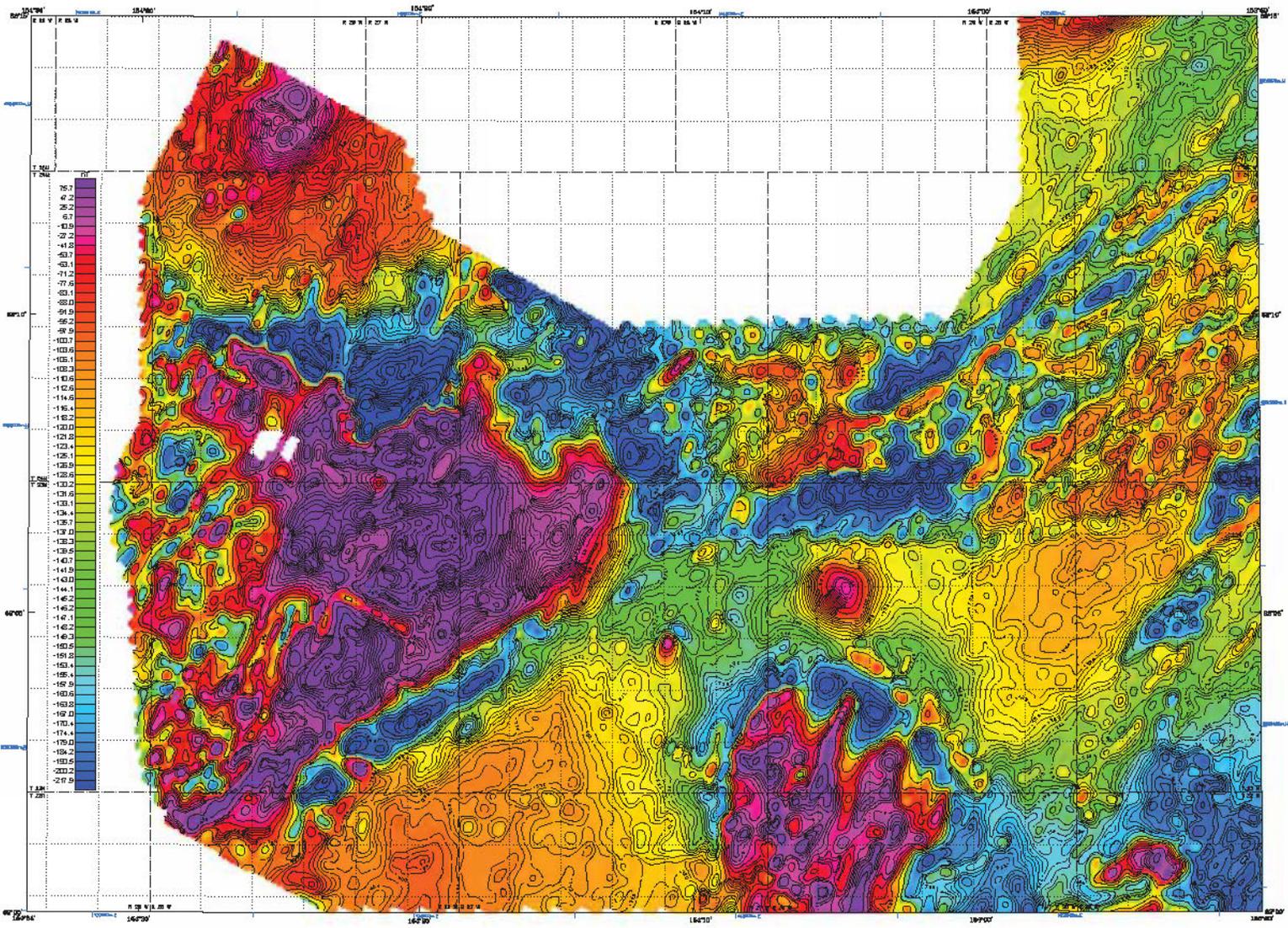


SURVEY HISTORY

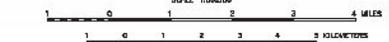
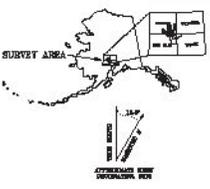
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. The current survey was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Department of Natural Resources Geophysical Inventory Program. Geosoft Inc. (GSI) provided the software used for the processing of the data. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS. DGGGS is located at 3000 Airport Road, Anchorage, Alaska 99508, and can be contacted by telephone at 907-269-0200 or by email at dgggs@alaska.gov. Maps are also available on paper through the DGGGS office or through the State of Alaska's online map service at www.alaska.gov. PDF file format.

MAGNETIC CONTOURS

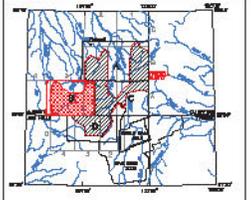
- 100 nT
- 50 nT
- 0 nT
- -50 nT
- -100 nT



Latitude values from U.S. Geological Survey GCS 83, NAD 83, 3-S, 30N, 30E, 30W, 30X, 30Y, 30Z, 30AA, 30AB, 30AC, 30AD, 30AE, 30AF, 30AG, 30AH, 30AI, 30AJ, 30AK, 30AL, 30AM, 30AN, 30AO, 30AP, 30AQ, 30AR, 30AS, 30AT, 30AU, 30AV, 30AW, 30AX, 30AY, 30AZ, 30BA, 30BB, 30BC, 30BD, 30BE, 30BF, 30BG, 30BH, 30BI, 30BJ, 30BK, 30BL, 30BM, 30BN, 30BO, 30BP, 30BQ, 30BR, 30BS, 30BT, 30BU, 30BV, 30BW, 30BX, 30BY, 30BZ, 30CA, 30CB, 30CC, 30CD, 30CE, 30CF, 30CG, 30CH, 30CI, 30CJ, 30CK, 30CL, 30CM, 30CN, 30CO, 30CP, 30CQ, 30CR, 30CS, 30CT, 30CU, 30CV, 30CW, 30CX, 30CY, 30CZ, 30DA, 30DB, 30DC, 30DD, 30DE, 30DF, 30DG, 30DH, 30DI, 30DJ, 30DK, 30DL, 30DM, 30DN, 30DO, 30DP, 30DQ, 30DR, 30DS, 30DT, 30DU, 30DV, 30DW, 30DX, 30DY, 30DZ, 30EA, 30EB, 30EC, 30ED, 30EE, 30EF, 30EG, 30EH, 30EI, 30EJ, 30EK, 30EL, 30EM, 30EN, 30EO, 30EP, 30EQ, 30ER, 30ES, 30ET, 30EU, 30EV, 30EW, 30EX, 30EY, 30EZ, 30FA, 30FB, 30FC, 30FD, 30FE, 30FF, 30FG, 30FH, 30FI, 30FJ, 30FK, 30FL, 30FM, 30FN, 30FO, 30FP, 30FQ, 30FR, 30FS, 30FT, 30FU, 30FV, 30FW, 30FX, 30FY, 30FZ, 30GA, 30GB, 30GC, 30GD, 30GE, 30GF, 30GG, 30GH, 30GI, 30GJ, 30GK, 30GL, 30GM, 30GN, 30GO, 30GP, 30GQ, 30GR, 30GS, 30GT, 30GU, 30GV, 30GW, 30GX, 30GY, 30GZ, 30HA, 30HB, 30HC, 30HD, 30HE, 30HF, 30HG, 30HH, 30HI, 30HJ, 30HK, 30HL, 30HM, 30HN, 30HO, 30HP, 30HQ, 30HR, 30HS, 30HT, 30HU, 30HV, 30HW, 30HX, 30HY, 30HZ, 30IA, 30IB, 30IC, 30ID, 30IE, 30IF, 30IG, 30IH, 30II, 30IJ, 30IK, 30IL, 30IM, 30IN, 30IO, 30IP, 30IQ, 30IR, 30IS, 30IT, 30IU, 30IV, 30IW, 30IX, 30IY, 30IZ, 30JA, 30JB, 30JC, 30JD, 30JE, 30JF, 30JG, 30JH, 30JI, 30JJ, 30JK, 30JL, 30JM, 30JN, 30JO, 30JP, 30JQ, 30JR, 30JS, 30JT, 30JU, 30JV, 30JW, 30JX, 30JY, 30JZ, 30KA, 30KB, 30KC, 30KD, 30KE, 30KF, 30KG, 30KH, 30KI, 30KJ, 30KK, 30KL, 30KM, 30KN, 30KO, 30KP, 30KQ, 30KR, 30KS, 30KT, 30KU, 30KV, 30KW, 30KX, 30KY, 30KZ, 30LA, 30LB, 30LC, 30LD, 30LE, 30LF, 30LG, 30LH, 30LI, 30LJ, 30LK, 30LL, 30LM, 30LN, 30LO, 30LP, 30LQ, 30LR, 30LS, 30LT, 30LU, 30LV, 30LW, 30LX, 30LY, 30LZ, 30MA, 30MB, 30MC, 30MD, 30ME, 30MF, 30MG, 30MH, 30MI, 30MJ, 30MK, 30ML, 30MN, 30MO, 30MP, 30MQ, 30MR, 30MS, 30MT, 30MU, 30MV, 30MW, 30MX, 30MY, 30MZ, 30NA, 30NB, 30NC, 30ND, 30NE, 30NF, 30NG, 30NH, 30NI, 30NJ, 30NK, 30NL, 30NM, 30NO, 30NP, 30NQ, 30NR, 30NS, 30NT, 30NU, 30NV, 30NW, 30NX, 30NY, 30NZ, 30OA, 30OB, 30OC, 30OD, 30OE, 30OF, 30OG, 30OH, 30OI, 30OJ, 30OK, 30OL, 30OM, 30ON, 30OO, 30OP, 30OQ, 30OR, 30OS, 30OT, 30OU, 30OV, 30OW, 30OX, 30OY, 30OZ, 30PA, 30PB, 30PC, 30PD, 30PE, 30PF, 30PG, 30PH, 30PI, 30PJ, 30PK, 30PL, 30PM, 30PN, 30PO, 30PP, 30PQ, 30PR, 30PS, 30PT, 30PU, 30PV, 30PW, 30PX, 30PY, 30PZ, 30QA, 30QB, 30QC, 30QD, 30QE, 30QF, 30QG, 30QH, 30QI, 30QJ, 30QK, 30QL, 30QM, 30QN, 30QO, 30QP, 30QQ, 30QR, 30QS, 30QT, 30QU, 30QV, 30QW, 30QX, 30QY, 30QZ, 30RA, 30RB, 30RC, 30RD, 30RE, 30RF, 30RG, 30RH, 30RI, 30RJ, 30RK, 30RL, 30RM, 30RN, 30RO, 30RP, 30RQ, 30RR, 30RS, 30RT, 30RU, 30RV, 30RW, 30RX, 30RY, 30RZ, 30SA, 30SB, 30SC, 30SD, 30SE, 30SF, 30SG, 30SH, 30SI, 30SJ, 30SK, 30SL, 30SM, 30SN, 30SO, 30SP, 30SQ, 30SR, 30SS, 30ST, 30SU, 30SV, 30SW, 30SX, 30SY, 30SZ, 30TA, 30TB, 30TC, 30TD, 30TE, 30TF, 30TG, 30TH, 30TI, 30TJ, 30TK, 30TL, 30TM, 30TN, 30TO, 30TP, 30TQ, 30TR, 30TS, 30TT, 30TU, 30TV, 30TW, 30TX, 30TY, 30TZ, 30UA, 30UB, 30UC, 30UD, 30UE, 30UF, 30UG, 30UH, 30UI, 30UJ, 30UK, 30UL, 30UM, 30UN, 30UO, 30UP, 30UQ, 30UR, 30US, 30UT, 30UU, 30UV, 30UW, 30UX, 30UY, 30UZ, 30VA, 30VB, 30VC, 30VD, 30VE, 30VF, 30VG, 30VH, 30VI, 30VJ, 30VK, 30VL, 30VM, 30VN, 30VO, 30VP, 30VQ, 30VR, 30VS, 30VT, 30VU, 30VV, 30VW, 30VX, 30VY, 30VZ, 30WA, 30WB, 30WC, 30WD, 30WE, 30WF, 30WG, 30WH, 30WI, 30WJ, 30WK, 30WL, 30WM, 30WN, 30WO, 30WP, 30WQ, 30WR, 30WS, 30WT, 30WU, 30WV, 30WW, 30WX, 30WY, 30WZ, 30XA, 30XB, 30XC, 30XD, 30XE, 30XF, 30XG, 30XH, 30XI, 30XJ, 30XK, 30XL, 30XM, 30XN, 30XO, 30XP, 30XQ, 30XR, 30XS, 30XT, 30XU, 30XV, 30XW, 30XX, 30XY, 30XZ, 30YA, 30YB, 30YC, 30YD, 30YE, 30YF, 30YG, 30YH, 30YI, 30YJ, 30YK, 30YL, 30YM, 30YN, 30YO, 30YP, 30YQ, 30YR, 30YS, 30YT, 30YU, 30YV, 30YW, 30YX, 30YY, 30YZ, 30ZA, 30ZB, 30ZC, 30ZD, 30ZE, 30ZF, 30ZG, 30ZH, 30ZI, 30ZJ, 30ZK, 30ZL, 30ZM, 30ZN, 30ZO, 30ZP, 30ZQ, 30ZR, 30ZS, 30ZT, 30ZU, 30ZV, 30ZW, 30ZX, 30ZY, 30ZZ



LOCATION INDEX FOR 1:63,360-SCALE MAPS



RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurie E. Burns, OGS, and Fugro Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DORNIER Electromagnetic (EM) system, a Fugro D1 base magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstar RS-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an RS-300-800 Super helicopter at a mean level of 2500 feet above MSL. Flight paths were flown 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 OEM-82L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 Mercator projection, datum using a central meridian (CM) of 152° north, central of G and an east constant of 600,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scripps 350 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 other variations), (3) leveled to the sea level data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

Alaska 14, 1403, is a new method of interpolation and smooths using least squares procedures applied at the resolution of computer hardware. 4-17, no. 4, p. 288-292.

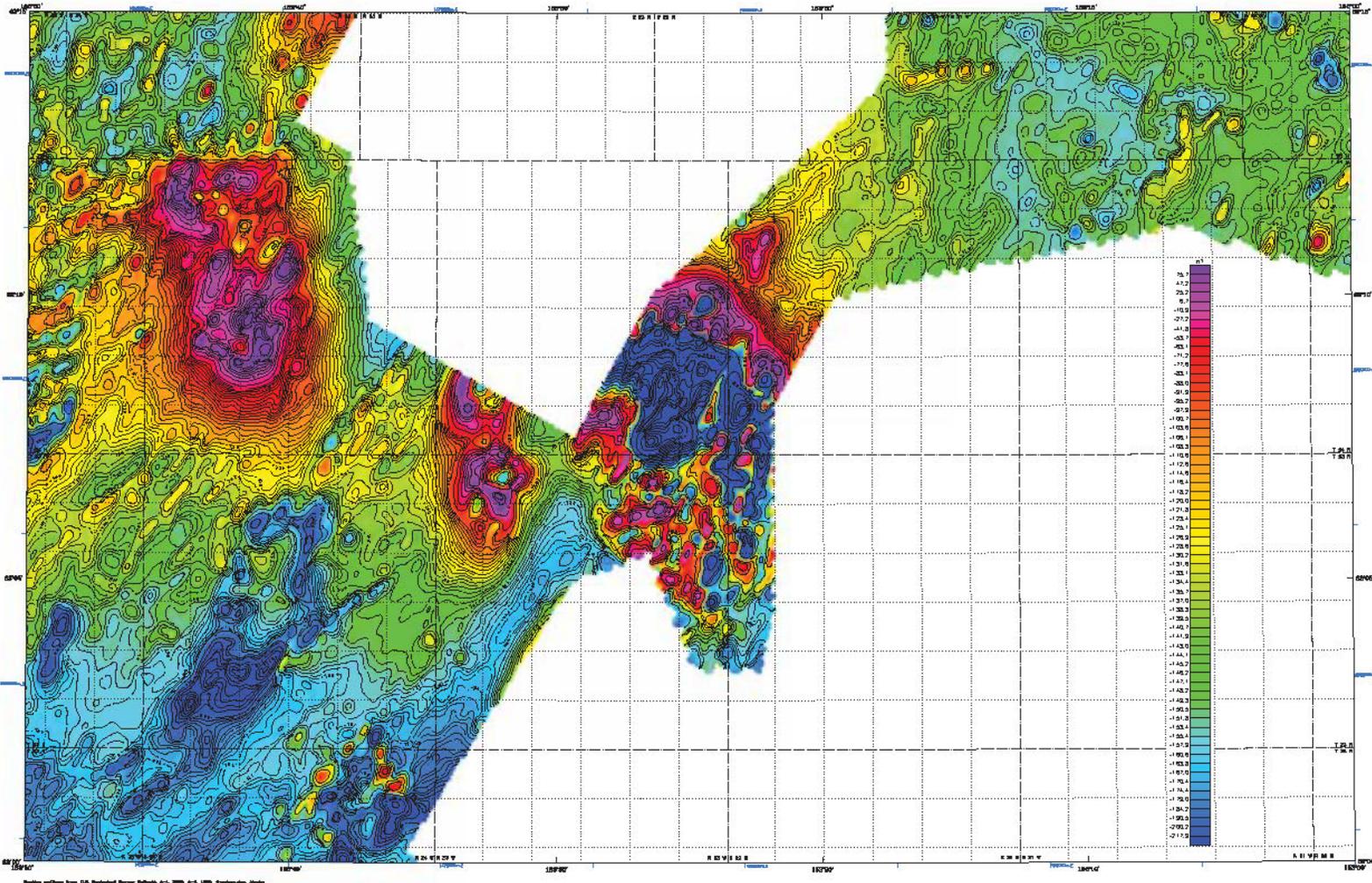
MAGNETIC CONTOURS

.....	100 ft
.....	50 ft
.....	4 ft
.....	2 ft

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 DGGGS in 2012, 2013, and 2014. Farewell Haven DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Minerals Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

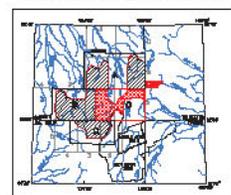
All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/pub/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.



Source: Modified from US Geological Survey (Schubert, et al., 1989, p. 106; Schuchnigg, 1988)

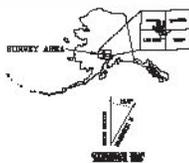


LOCATION INDEX FOR 1:63,360-SCALE MAPS



RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Larrel E. Burns, CGG, and Fugro Geoservices, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOTECH Electromagnetics (EM) system, a Fugro D1344 magnetometer with a Bartington CS3 datum sensor and a Rodion Solutions RB-200 gamma-ray spectrometer. Some flight tracks are red because the data were on Expedition GM-833 spectrometer. The EM and magnetometer sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser interferometry and video cameras. Flights were performed with an AS-350-B3 Sikorski helicopter at a mean terrain clearance of 200 feet along 140-90 (120°) survey flight lines with a spacing of a quarter of a mile. The line was flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Hottel DEMS-C2L Coded Positioning System was used for navigation. The helicopter position was observed every 6-7 seconds using post-flight differential positioning to a reference station of better than 0.1 m. Flight data positions were corrected using the China 1980 (UTM zone 6) spheroid, 1983 North American datum using a datum vector of 137.7, a north constant of 0 and an east constant of 268,000. Profiled contours of the presented data is better than 10 m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic field data were processed using slightly recorded data from a Fugro D1344 magnetometer with a Bartington CS3 datum sensor. The magnetic data were (1) corrected for diurnal variation by subtraction of the slightly recorded base station magnetic data; (2) AMF corrected (AMF model 2010, updated for date of flight and observer operation); (3) leveled to the tie data; and (4) integrated onto a regular 80 m grid using a modified Amey (1970) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final data contained in this publication.

Notes: 1. 1980. A new method of integration and spatial averaging, based on least-squares, of the publication of Geophysical Research, v. 77, no. 4, p. 638-642.

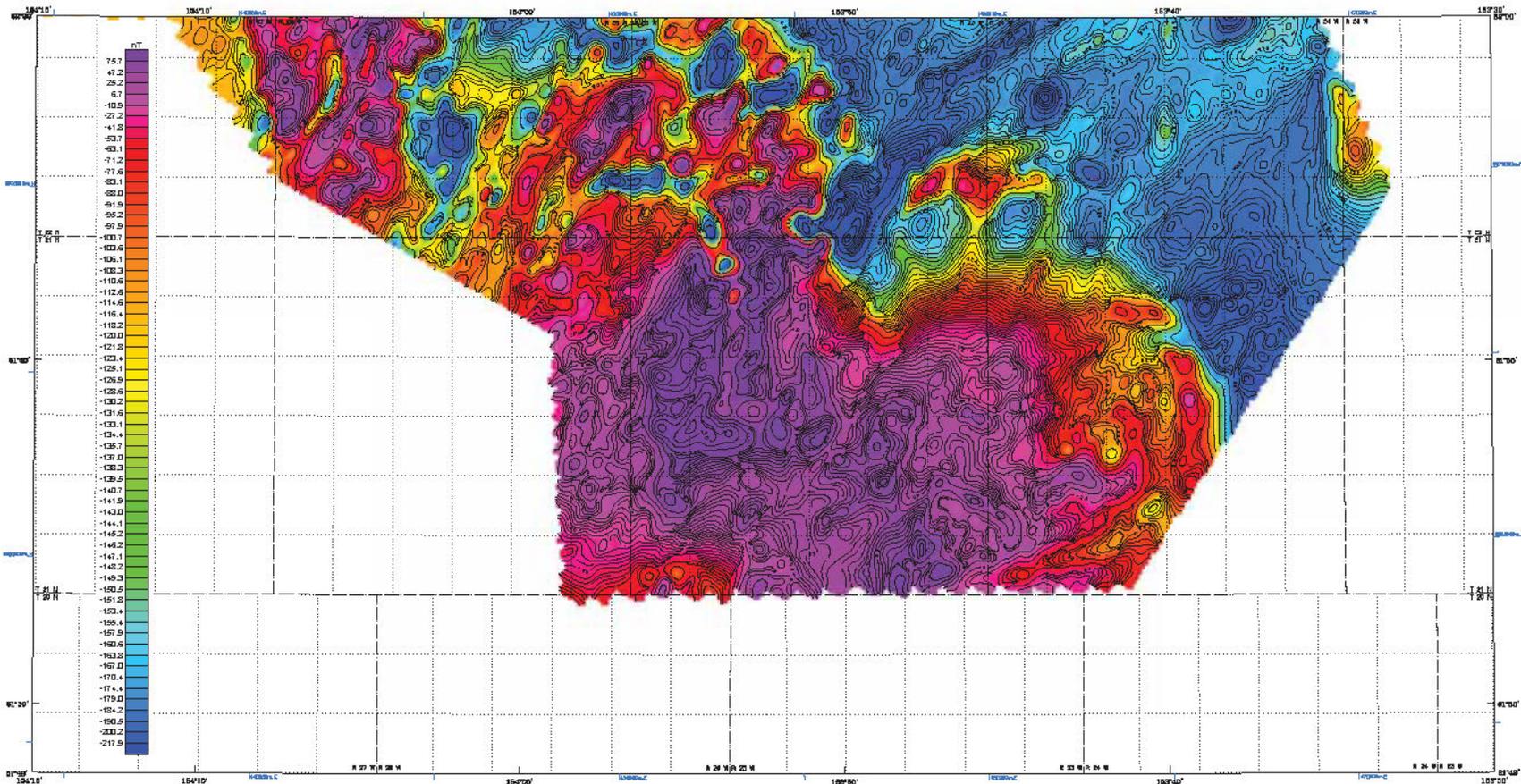
MAGNETIC CONTOURS

.....	100 nT
.....	50 nT
.....	4 nT
.....	3 nT

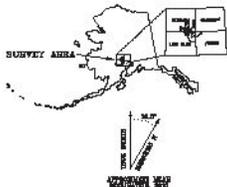
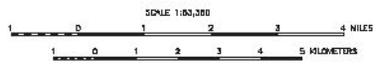
SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Surveys (DGRS), and Fugro Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2010, 2013, and 2014. Previously flown DGRS surveys adjacent to the current survey are shown in the location map by dashed lines. Survey names and date of publication. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Geospatial and Geological Survey Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work.

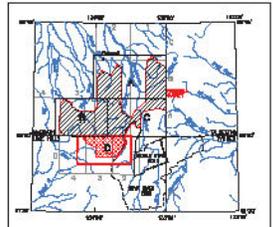
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through CGG, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the CGG website (www.cgg.com/usa/). Maps are also available on paper through the DGRS office, and are available online at the website in Adobe Acrobat (.PDF) file format.



1:50,000 Scale Map of the Farewell Survey Area, South-Central Alaska. Contour Interval: 10 nT.



LOCATION INDEX FOR 1:50,000-SCALE MAPS



RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Sontrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1,200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Sontrex 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) IGR corrected (IGRF model 2010, updated for data of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 90 m grid using a modified Akima (1970) technique. All grids were then resampled from the 90 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alamo, 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. 840-845.

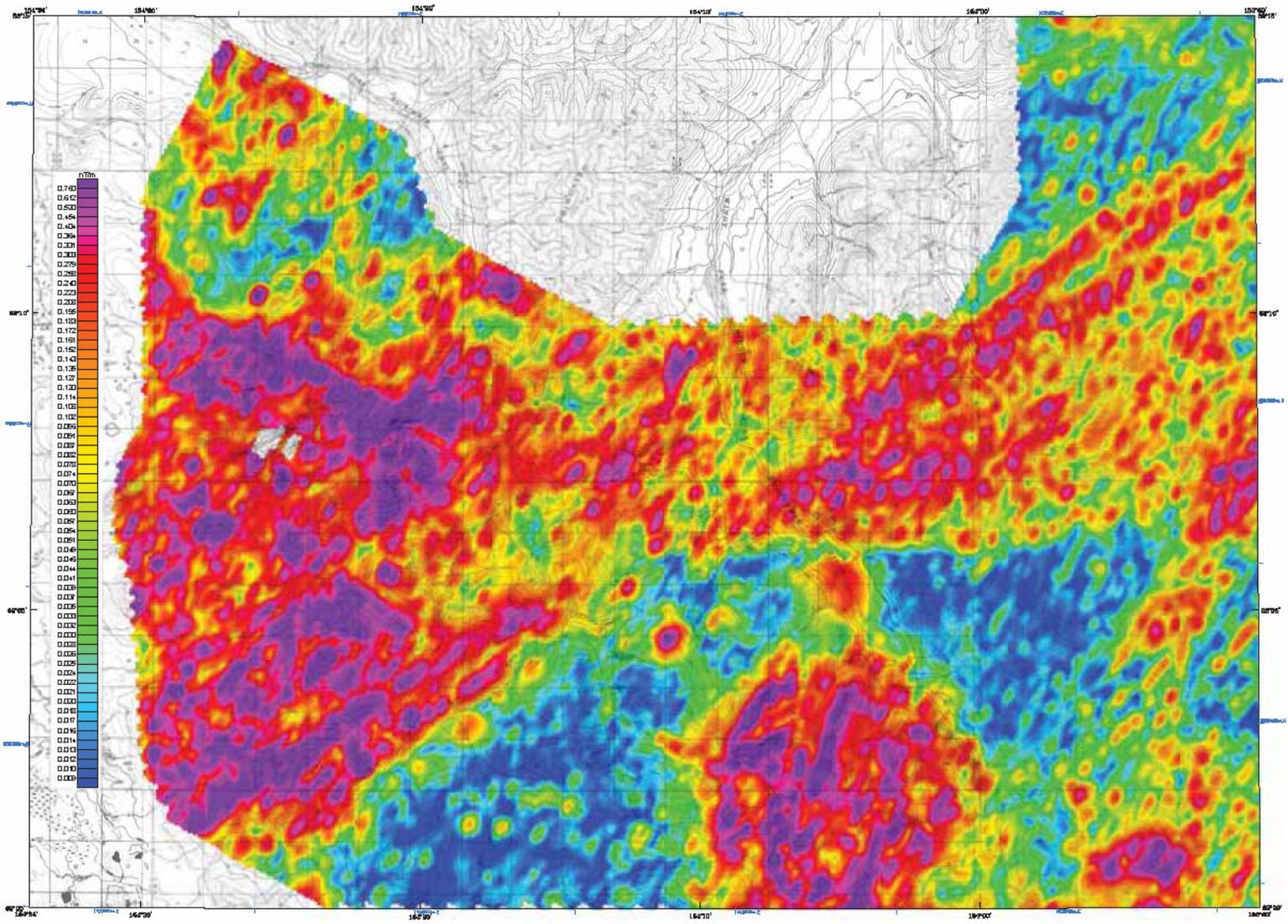
MAGNETIC CONTOURS

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

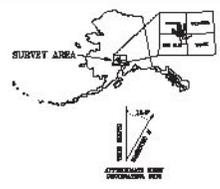
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3304 Collins 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 effort and are viewable online at the website in Adobe Acrobat PDF file format.



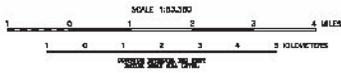
See Sheet 218, Geophysical Survey Methods, A-C, 1988, A-D, 1989, Methods A-C, 1991, Geophysical Data.



DESCRIPTIONS NOTES

The geophysical data were acquired with a DORAD® Electromagnetic (EM) system, a Fugro D1300 magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an ESR-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems. 50,000 Hz monitors and video cameras. Flights were performed with an RS-300-80 Standard helicopter at a mean level of clearance of 2500 feet along NW-SE (120°) 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 OEM4-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153° north-south, of 0 and an east constant of 600,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.



ANALYTIC SIGNAL WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

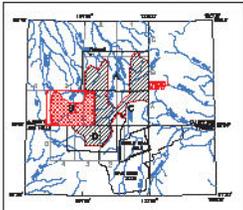
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurie E. Burns, OGS, and Fugro Geosciences, Inc.
2014

ANALYTIC SIGNAL

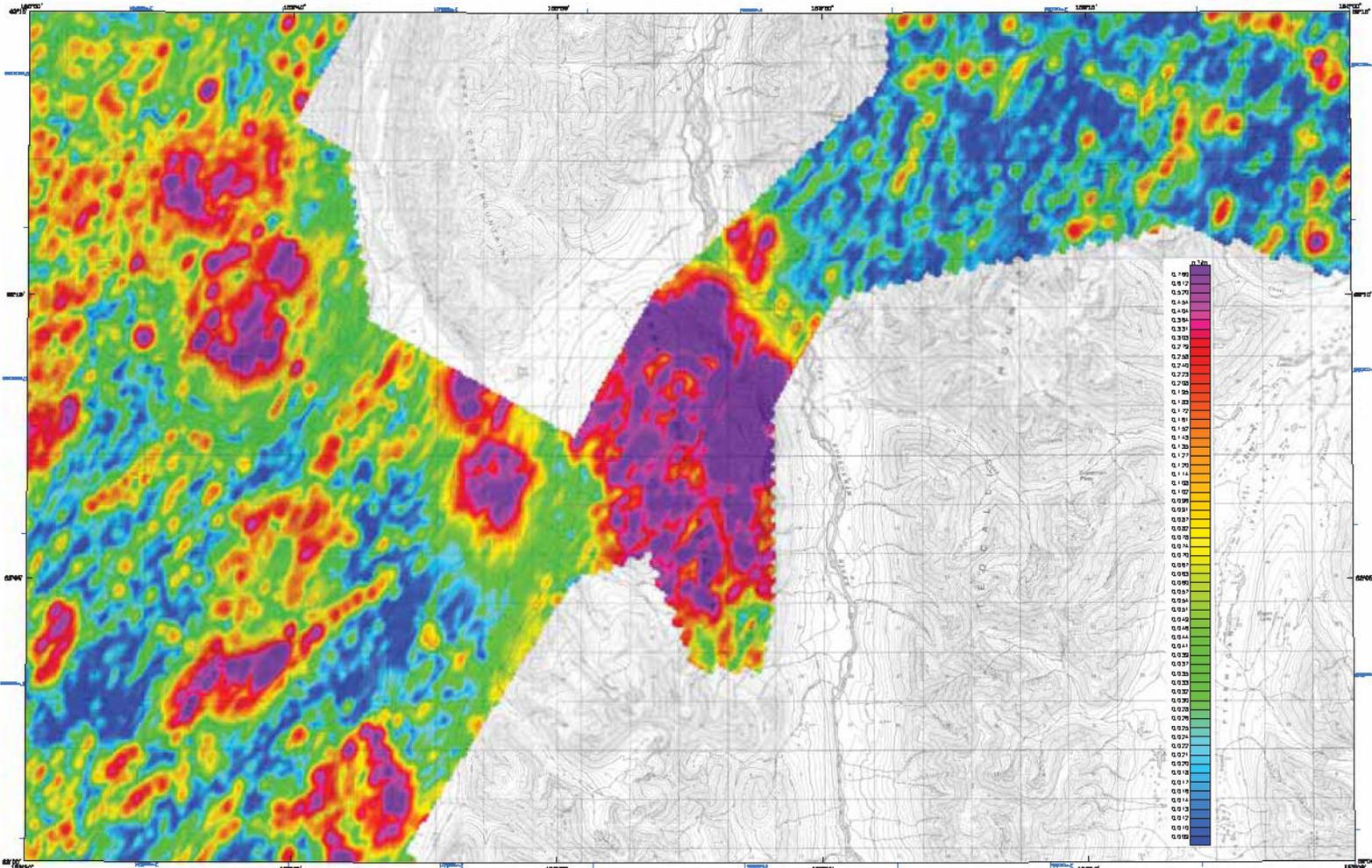
Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the isolated analytic signal of magnetic parameter locate the anomalous source body edges and corners (e.g., contacts, fault/dipor zones, 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 FOR 1:63,360-SCALE MAPS



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 Geosciences, Inc. Alaska geophysical data for the area were acquired and processed by DGG in 2012, 2013, and 2014. Fugro's former DGG survey work related to the current survey are shown in the location map by dashed lines, survey lines, and dots of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geological and Geological Minerals Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGG, 3354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGG website (www.dggs.alaska.gov/pubs/). Maps are also available on paper through the DGG office, and are available online at the website in Adobe Acrobat .PDF file format.

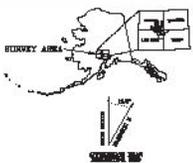


Scale from U.S. Geological Survey (Smith et al., 1984, p. 4, 1984, Washington, Alaska).



**ANALYTIC SIGNAL
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Larrel E. Burns, CGG, and Flugo Geoservices, Inc.
2014



DESCRIPTIVE NOTES

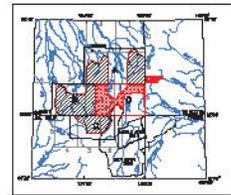
The geophysical data were acquired with a GEOSKY Electromagnetics (EM) system, a Flugo D1244 magnetometer with a Geosky G30 coil assembly and a Rodentek Solutions RB-200 gamma-ray spectrometer. Data files include the raw magnetic data with an Explorerium EM-832 spectrometer. The EM and magnetometer were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an AS-350B-33 Super Puma helicopter at a mean terrain clearance of 200 feet along IM-92 (1977) 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 Trimble DGMS-C2L Global Positioning System was used for navigation. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the Global Positioning System (GPS) 1983 North American datum using a Geosky G30 magnetometer. The datum is a combination of UTM and NAD83. Positioning accuracy of the presented data is better than 10 m with respect to the UTM grid.

ANALYTIC SIGNAL

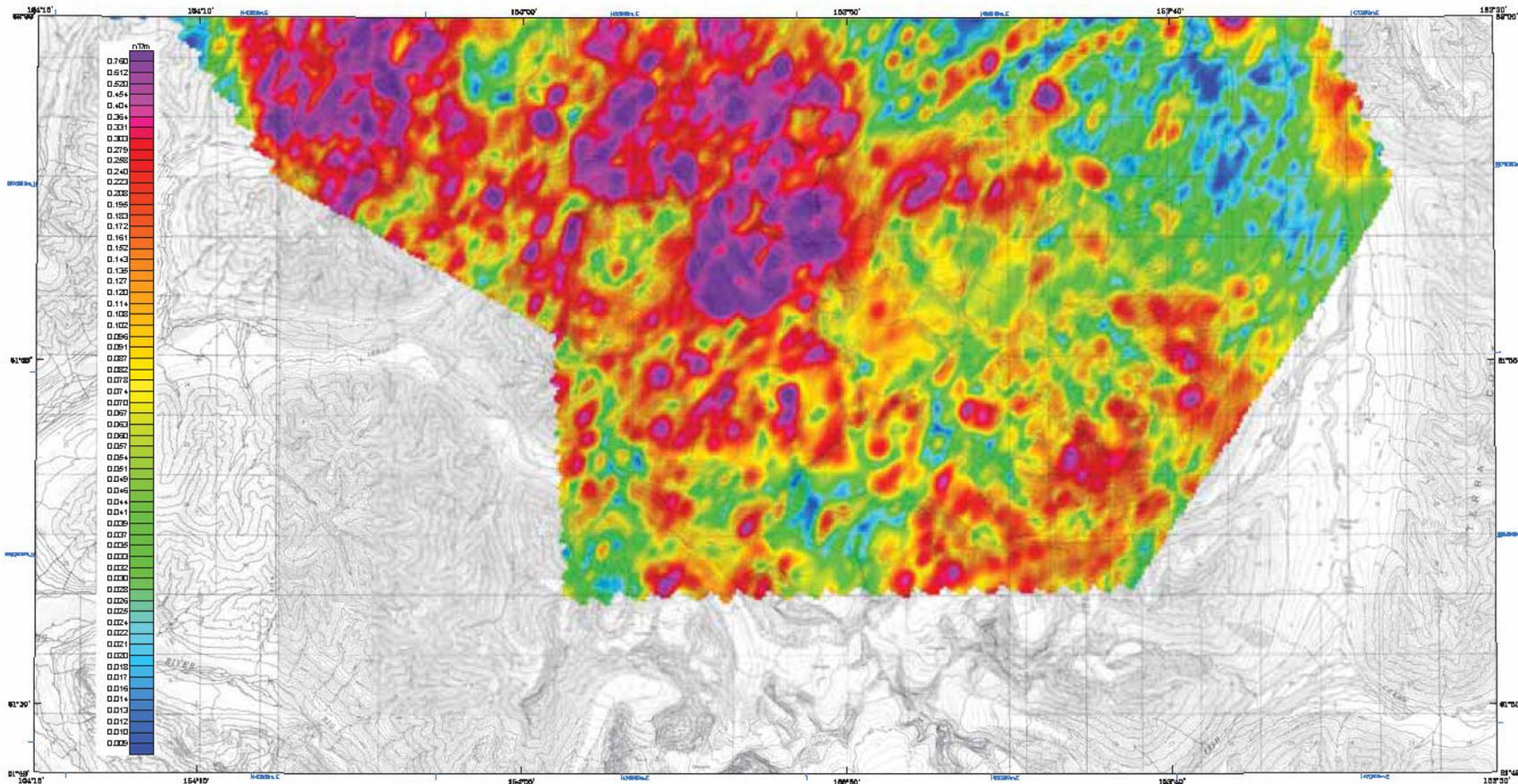
Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Magnetic highs in the calculated analytic signal of magnetic gradient locate the anomalous source body edges and corners (e.g., contacts, fault/trace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

LOCATION INDEX FOR 1:63,360-SCALE MAPS

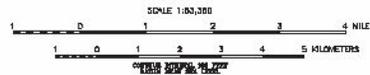


SURVEY HISTORY

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 Flugo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2013, 2013, and 2014. Previously, Flugo Geoservices was obligated to the current survey area shown in this location map by signed inter-agency memoranda and data of publication. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska Airborne Geophysical and Geological Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format in DGGGS for a central file through DGGGS, 2200 Chena Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.state.ak.us/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.

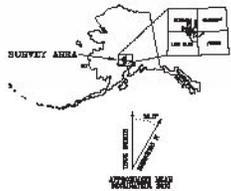


DATE: 2014-05-08, TIME: 09:00, AREA: 154°10' - 154°15' W, 61°30' - 61°35' N, UTM, Zone 53, Datum: NAD83, Contour Interval: 20m



**ANALYTIC SIGNAL
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fuqro GasServices, Inc.
2014



DESCRIPTIVE NOTES

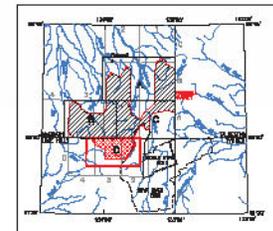
The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 100- \times 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 53) spheroid, 1927 North American datum using a central meridian (CM) of 152, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ANALYTIC SIGNAL

Analytic signal is the total amplitude of all directions of magnetic gradient, calculated from the sum of the square of the three orthogonal gradients. Higher High in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (e.g., contact, 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.

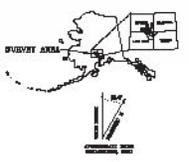
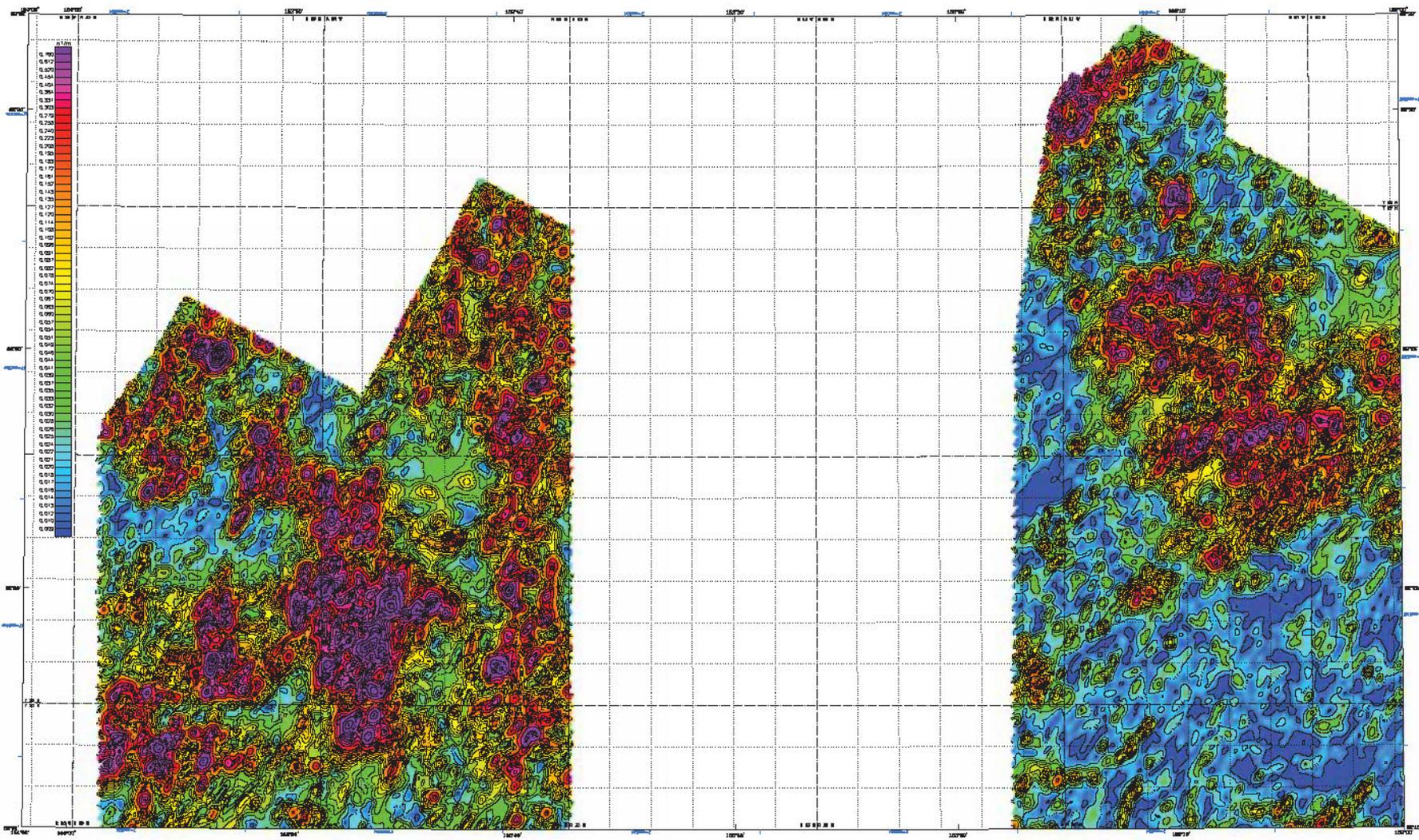
LOCATION INDEX FOR 1:63,560-SCALE MAPS



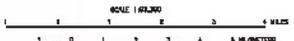
SURVEY HISTORY

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 Fuqro GasServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Dillingham 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.



LOCATION OF SURVEY AREA



**ANALYTIC SIGNAL
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Duran, CGA and Fugro Geometrics, Inc.
2014

DESCRIPTIVE NOTES

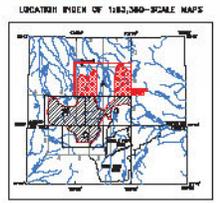
The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro OTC magnetometer with a custom 240 degree sensor, and a Fugro Navigation 100-200 ground-truth system. Some flights acquired the magnetic data with an Explorer 60-200 magnetometer. The EM and magnetic sensors were flown at a height of 100 feet, the geometry measurements were flown at a height of 200 feet, in addition this survey completed data from 1000 1000 1000 and 1000 1000 1000. The EM and magnetic sensors were flown at a height of 100 feet, the geometry measurements were flown at a height of 200 feet, in addition this survey completed data from 1000 1000 1000 and 1000 1000 1000. The EM and magnetic sensors were flown at a height of 100 feet, the geometry measurements were flown at a height of 200 feet, in addition this survey completed data from 1000 1000 1000 and 1000 1000 1000.

ANALYTIC SIGNAL

Analytic signal is the total amplitude of all derivatives of magnetic gradient calculated from the sum of the magnetic of the three orthogonal axes. Height in the calculated analytic signal is magnetic parameter inside the magnetic source body edges and corners (see, example that/where some etc.). Analytic signal contouring was conducted directly over the data, regardless of elevation data, and independently of the choice of the below data network registration.

ANALYTIC SIGNAL CONTOURS

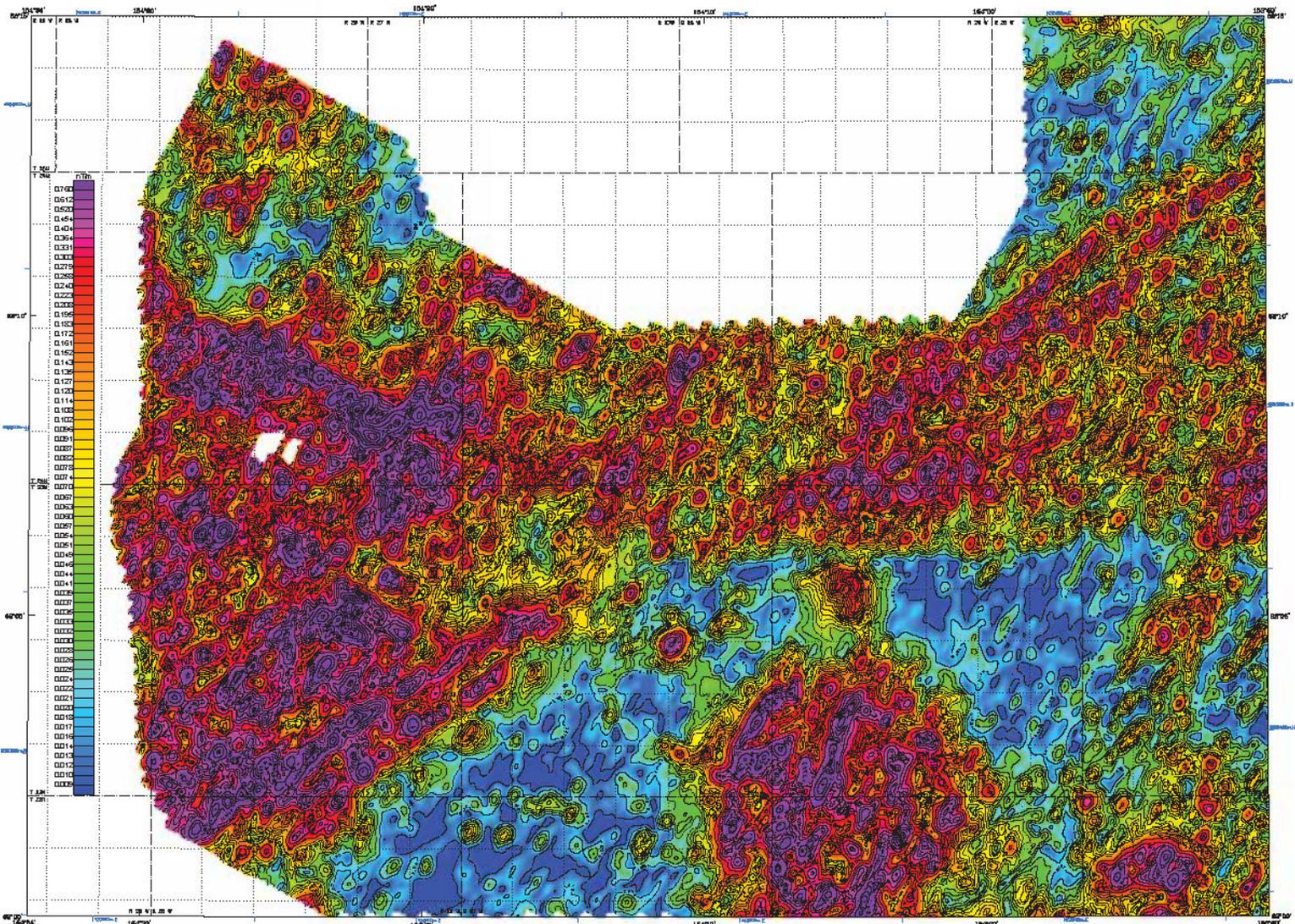
.....	0.20 nT/miles
.....	0.10 nT/miles
.....	0.05 nT/miles
.....	0.01 nT/miles



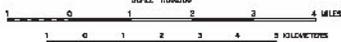
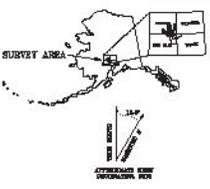
LOCATION OF 1:62,500-SCALE MAPS

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 Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by DGGS in 2012, 2013, and 2014. Previously flown DGGS magnetic data acquired in the current survey are shown in the location map by dashed lines every 1000 feet and data of previous surveys are shown in the Alaska State Database as part of the State Geologic and Geophysical Assessment project, which is part of the Alaska Airborne Geophysical and Geospatial Inventory Program. Geospatial Systems, Inc. (GSI) contributed funding for a portion of the survey. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3300 Delaney Road, Fairbanks, Alaska, 99707-2000, and are distributed for free over the DGGS website (www.dggs.alaska.gov/data). Maps are also available on paper through the DGGS office and on flexible media of the maps in Alaska Aerial PDF file format.



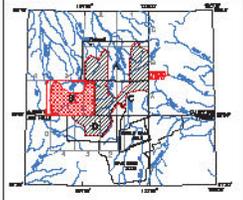
Latitude values from U.S. Geological Survey sheets 3-4, 305, 3-4, 306, 307, 3-4, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 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.



**ANALYTIC SIGNAL
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geoservices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHBY Electromagnetics (EM) system, a Fugro D'Adda magnetometer with a Scripps 350 coil sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstar 20-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an Agusta-Bell Super Puma helicopter at a mean level of clearance of 2500 feet along NW-SE (20°) 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 OEM3-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1987 North American datum using a central meridian (CM) of 153° 0' north-south, of 0 and an east constant of 600,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ANALYTIC SIGNAL

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

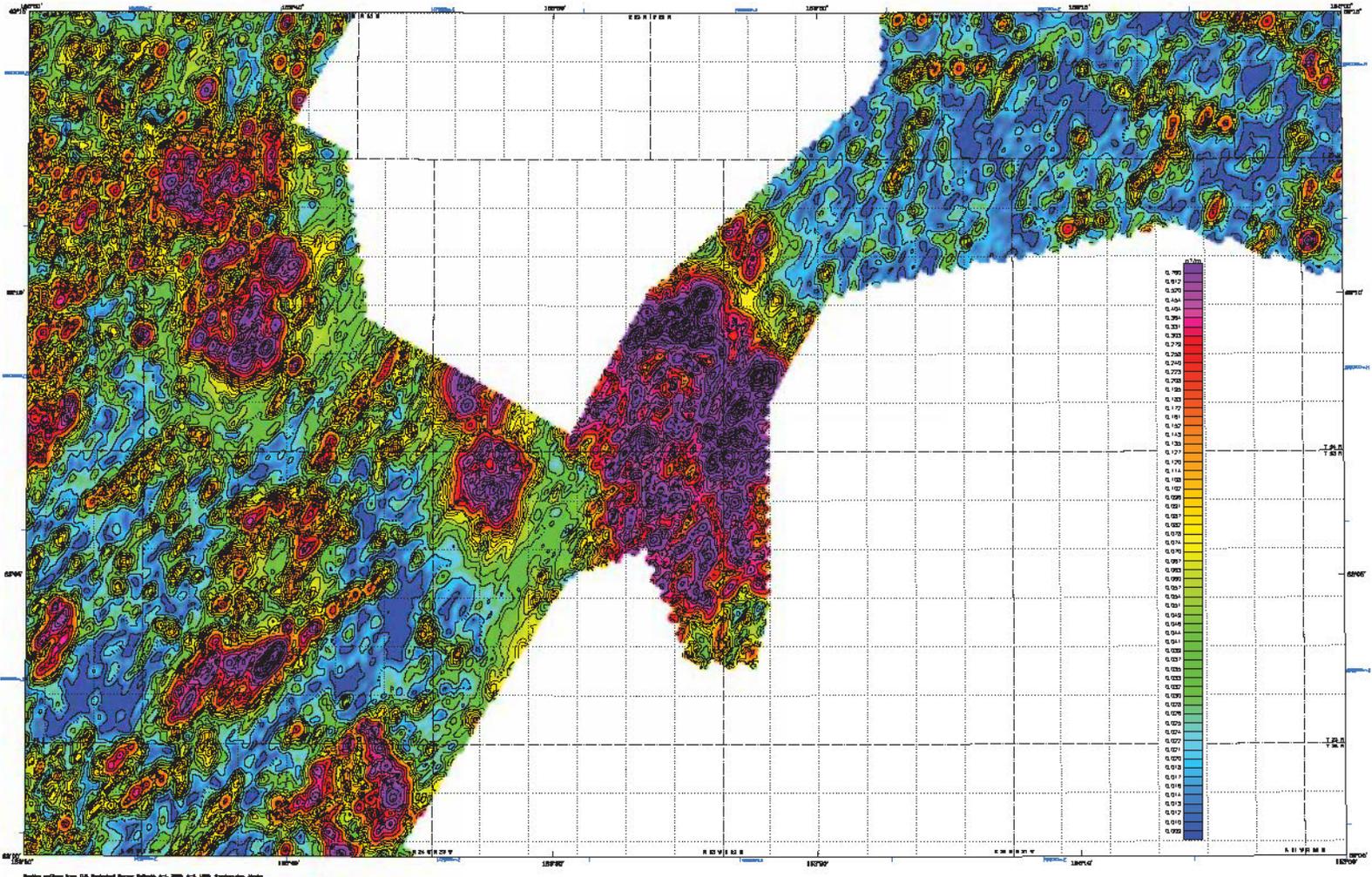
ANALYTIC SIGNAL CONTOURS

.....	0.30 nT/metre
.....	0.10 nT/metre
.....	0.02 nT/metre
.....	0.01 nT/metre

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. Alaska geophysical data for the area were acquired and processed by DGG in 2012, 2013, and 2014. Previously flown DGGGS surveying data pertinent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

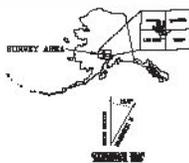
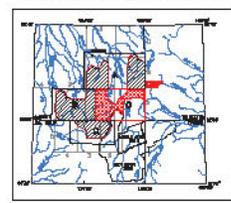
All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.



Source: Modified from U.S. Geological Survey Geophysics Data, 1999, 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014



LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES
 The geophysical data were acquired with a GEOSPEC Electromagnetics (EM) system, a Fugro D1244 magnetometer with a battery pack, a dual antenna and a Rodascan Solutions RB-200 gamma-ray spectrometer. Some flight tracks are red-colored data sets on Explorer EM-832 spectrometer. The EM and magnetometer systems were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimeters, GPS navigation system, 30-second magnetometers and video cameras. Flights were performed with an AS-350B3 helicopter. Helicopter altitudes were maintained at a mean terrain clearance of 200 feet during IM-92 (2007) survey flights 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 Fugro DEMS-C2L Chieftain Positioning System was used for navigation. The helicopter positions were observed every 6-3 seconds using post-flight differential positioning to a reference station by better than 0.1 m. Flight path positions were corrected using the China 1980 (UTM zone 6) spheroid, 1927 North American datum using a curved meridian (CM) of 137.0 north constant of 0 and an east constant of 268,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ANALYTIC SIGNAL
 Analytic signal is the total gradient of all derivatives of magnetic field calculated from the sum of the squares of the three orthogonal gradients. Slope angle in the extracted analytic signal of magnetic parameter locate the anomalous source body edges and corners (e.g., contacts, fault/line 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.

ANALYTIC SIGNAL WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA
 PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

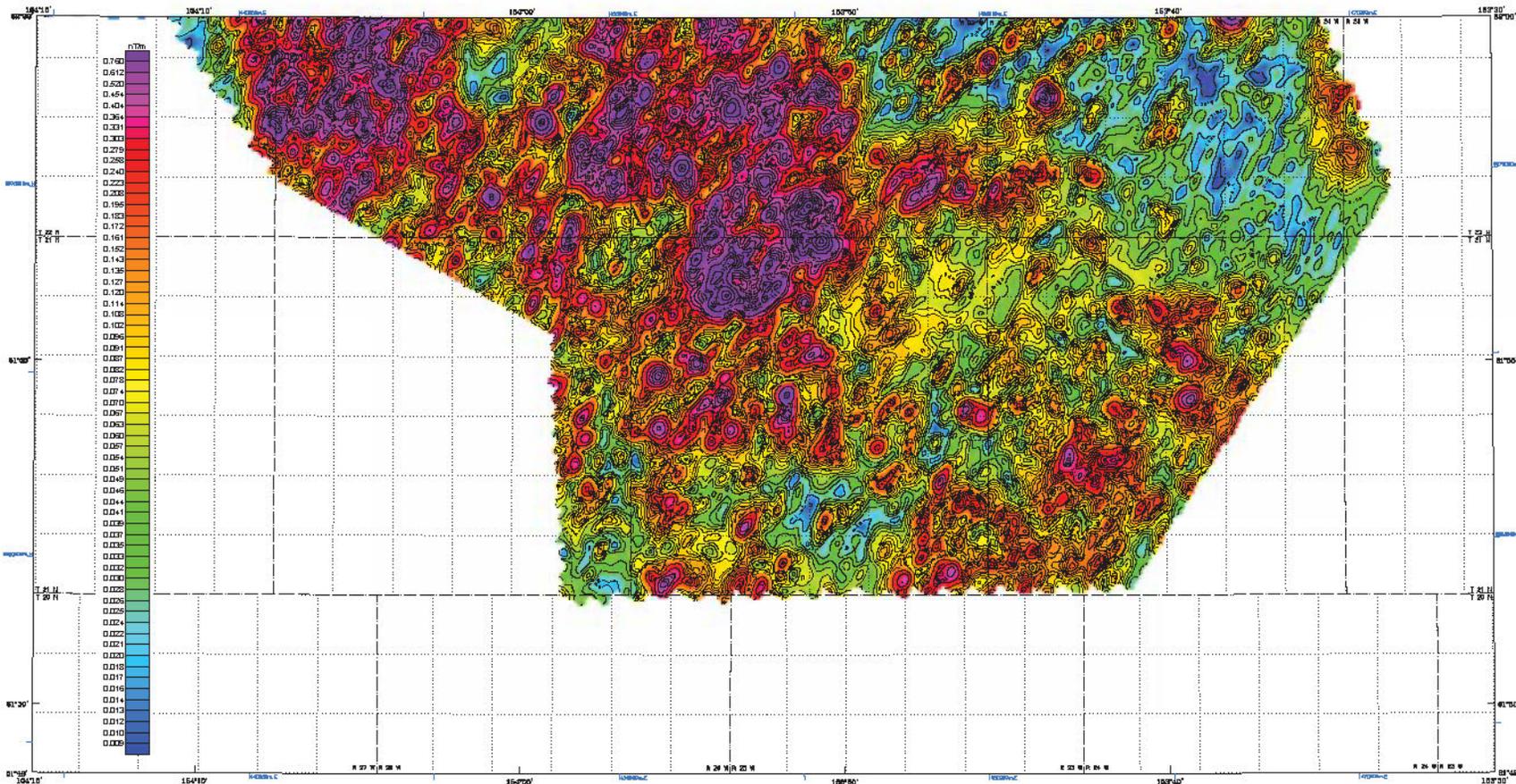
by
 Laurel E. Burns, CGG, and Fugro Geoservices, Inc.
 2014

ANALYTIC SIGNAL CONTOURS

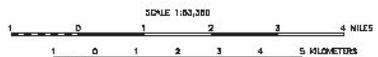
.....	0.40 nT/mrms
.....	0.10 nT/mrms
.....	0.02 nT/mrms
.....	0.01 nT/mrms

SURVEY HISTORY
 This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Surveys (DGRS), and Fugro Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2010, 2013, and 2014. Previously, many DGRS surveys conducted in the current survey area shown in this location map by Stephen Fisher, survey manager, and data of publication. The project was funded by the Alaska State Department as part of the Alaska Geologic and Geospatial Information Assessment project, which is part of the Alaska Airborne Geospatial and Geologic Information Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work.

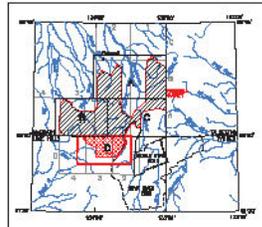
All data and maps produced to date from DGRS survey are available in digital format in DNO for a central file through DGRS, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGRS website (www.dgs.state.ak.us/dgs/). Maps are also available on paper through the DGRS office, and are available online at the website in Adobe Acrobat (.PDF) file format.



ANALYTIC SIGNAL DATA ACQUIRED BY CGG, GEOPHYSICAL SERVICES, INC. (CGG) ON 2/14/2014. DATA ACQUIRED BY CGG, GEOPHYSICAL SERVICES, INC. (CGG) ON 2/14/2014. DATA ACQUIRED BY CGG, GEOPHYSICAL SERVICES, INC. (CGG) ON 2/14/2014.



LOCATION INDEX FOR 1:63,560-SCALE MAPS



ANALYTIC SIGNAL WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1/4-mile (120') 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. In flight conditions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ANALYTIC SIGNAL

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

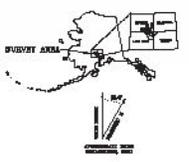
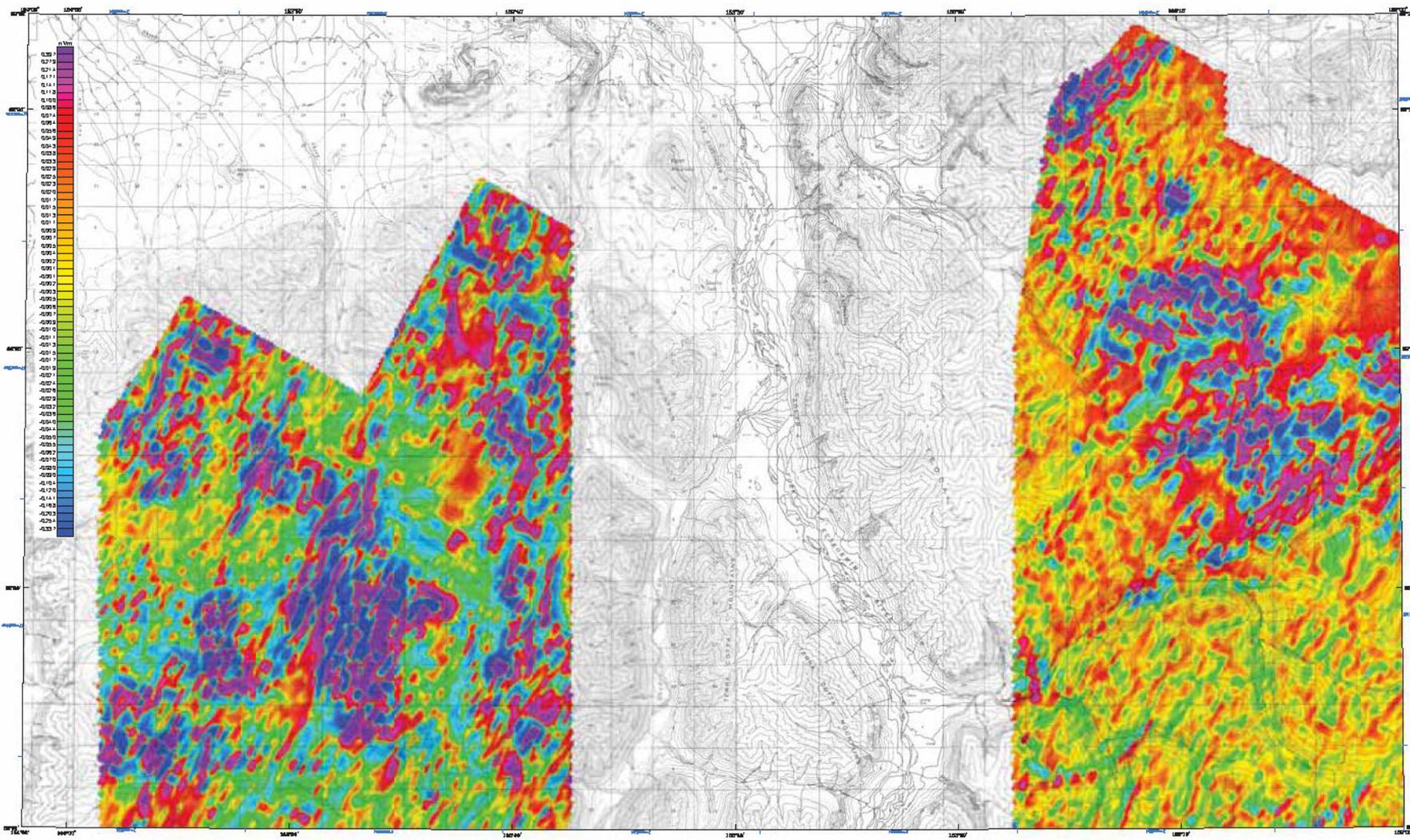
ANALYTIC SIGNAL CONTOURS

.....	0.50 nT/metre
.....	0.10 nT/metre
.....	0.05 nT/metre
.....	0.01 nT/metre

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

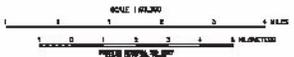
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGG website (www.dggg.alaska.gov/pubs). Maps are also available on paper through the DGGG office, and are viewable online at the website in Adobe Acrobat PDF file format.



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSPEC Electromagnetic (EM) system, a Super Conducting magnetometer with a custom 240 degree sensor, and a Positional System (PS) 200 ground-station system. Some flights acquired the magnetic data with an Explorer-60-200 magnetometer. The EM and magnetic sensors were flown at a height of 200 feet. The geometry measurements were taken at a height of 200 feet. In addition, the survey collected data from a total station, a GPS receiver, and a laser altimeter. The data were collected at a north-south orientation of 250 feet with a spacing of a quarter of a mile. The data were then interpolated to the grid lines at intervals of approximately 3 miles.

A 1982 USGS 1:50,000 Digital Elevation Model (DEM) was used for projection. The magnetic declination was derived from a 1:50,000 USGS 1982 DEM. The magnetic declination is a relative quantity to a relative anomaly of the Earth's magnetic field. The data were projected onto the Alaskan Albers (AKN) zone 50 projection, 1982 North American datum using a central meridian (CM) of 152° 30' north-south of 0 and an angle of 90.000. The accuracy of the projected data is better than 10 m with respect to the UTM grid.



FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

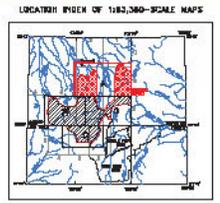
by
 Laurel E. Duran, CGA and Fugro Geoscience, Inc.
 2014

COLOR BAR HISTOGRAM

Approximately 90% of the first vertical derivative of the magnetic field for the Farewell Survey Area (shown in blue) were the range displayed in the color bar. Data values outside range from -15.881 nT/m (dark blue) to 0.280 nT/m (orange).

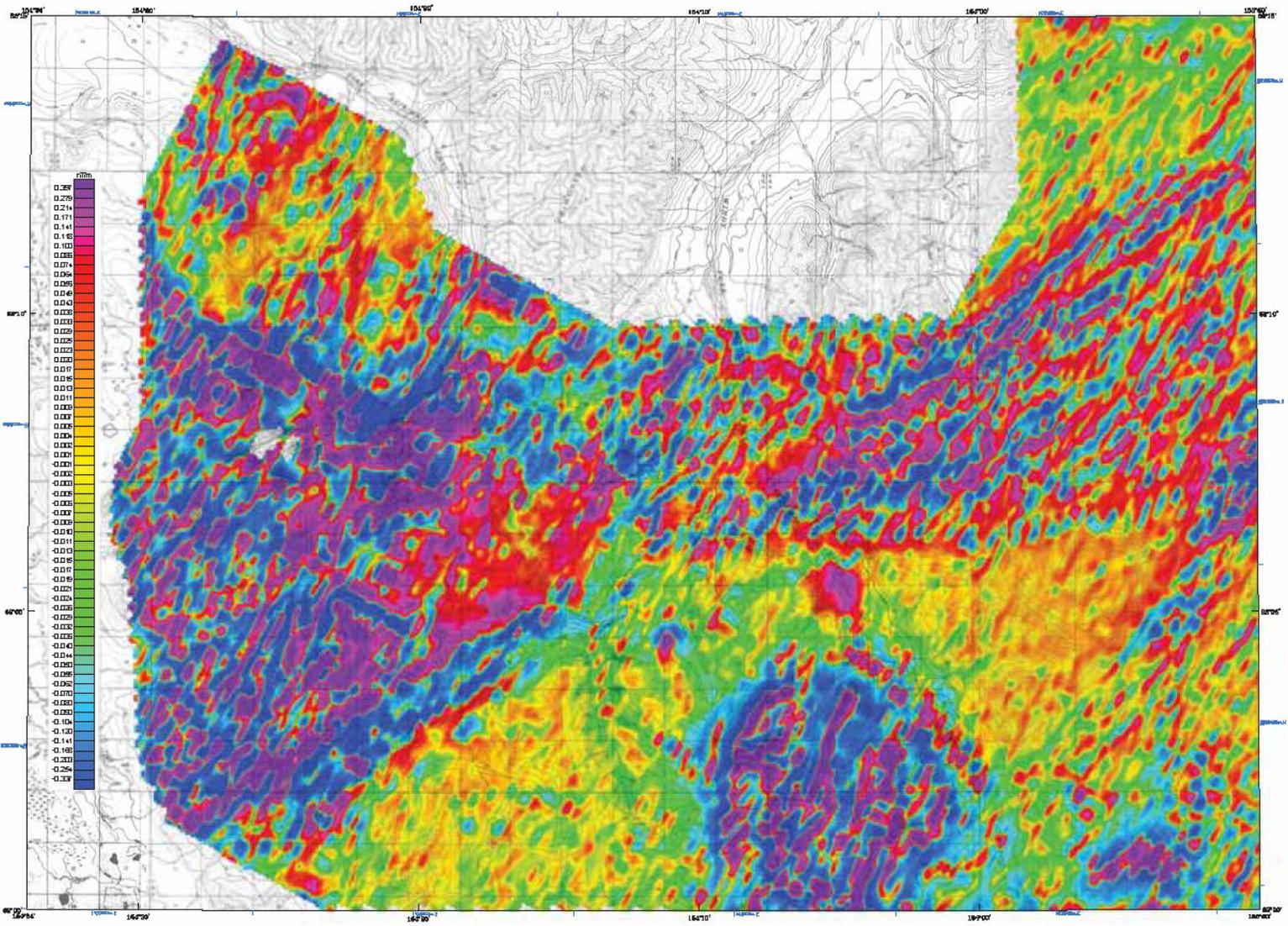
FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Super Conducting magnetometer with a custom 240 degree sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) detrended for diurnal variations by subtracting the digital recorded base station magnetic data, (2) were processed using a 200 Hz low-pass filter, (3) were processed using a 200 Hz low-pass filter, (4) were processed using a 200 Hz low-pass filter, (5) were processed using a 200 Hz low-pass filter, (6) were processed using a 200 Hz low-pass filter, (7) were processed using a 200 Hz low-pass filter, (8) were processed using a 200 Hz low-pass filter, (9) were processed using a 200 Hz low-pass filter, (10) were processed using a 200 Hz low-pass filter.

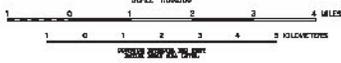
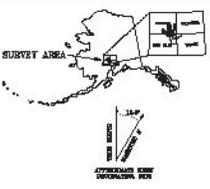


SURVEY HISTORY

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 Geoscience, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. The current survey was shown in the location map. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveying Program. Geologic maps, including the 1:50,000-scale maps, are available in the Alaska State Department of Natural Resources, Division of Geological & Geophysical Surveys, 1400 West Northern Avenue, Anchorage, Alaska 99501. For more information, visit the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office and on a web-based version of the maps in Alaska. PDF files are available.



See Item 2.8, Radiometric Survey Methods, A-C, 1998, A-D, 2008, Methods A-C, 1997, Spectrometry, 2008.

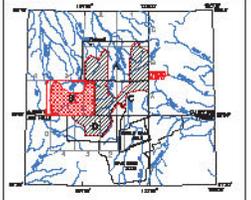


FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geoservices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DSDM24 Electromagnetics (EM) system, a Fugro D1364 magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Epsilon 20-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an Ag50-82 Super II helicopter at a mean terrain clearance of 2500 feet along 100-50 (120°) 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 OEMS-62L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 3 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153° 0' north-south, 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.

COLOR BAR HISTOGRAM

Approximately 80% of the first vertical derivative of the magnetic field for the Wonagella Survey Area dataset lie within the range displayed on the color bar. Data values actually range from -15.891 nT/m (dark blue) to about 7.867 nT/m (magenta).

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

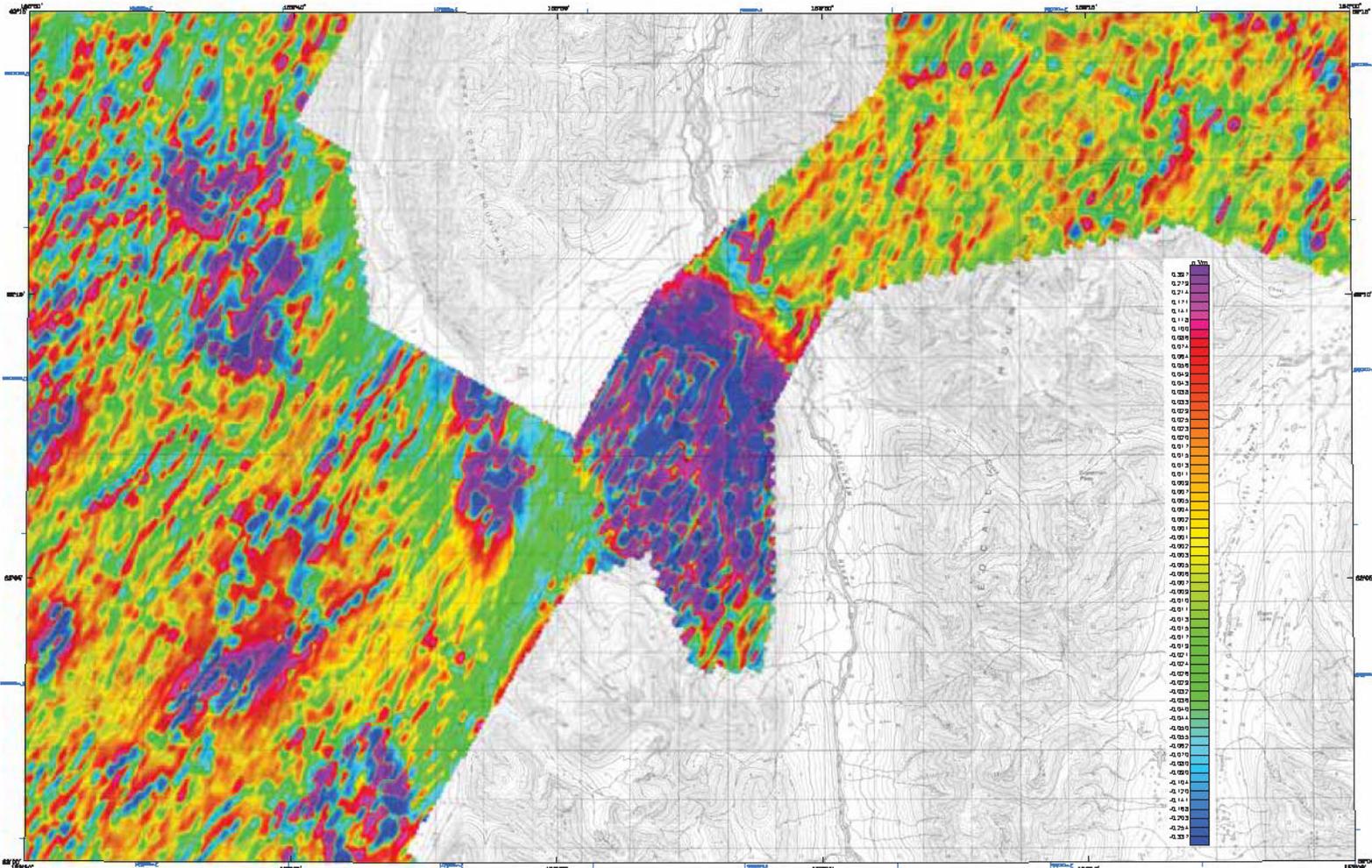
The magnetic total field data were processed using digitally recorded data from a Fugro D1364 magnetometer with a Scripps 350 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGR corrected (IGR model 2010), updated for drift of flight and altimeter uncertainties, (3) leveled to the 1st line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1978) technique. All grids were then resampled from the 80 m cell size down to a 10 m cell size to produce the maps and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

Miller, H., 1978. A new method of interpolation and results using finite basis in least-squares method of the assessment of magnetic intensity. p. 17. in: G. p. 108-115.

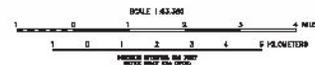
SURVEY HISTORY

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 former geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys correspond to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Minerals Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

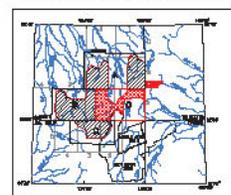
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (<http://dgggs.alaska.gov/>). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.



Scale: 1:43,200



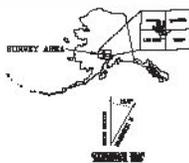
LOCATION INDEX FOR 1:63,360-SCALE MAPS



FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Leland E. Burns, CGG, and Flujo Geoservices, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSKY Electromagnetics (EM) system, a Flujo D1244 magnetometer with a Schlumberger CS3 coil assembly and a Rodascan Solutions RB-200 gamma-ray spectrometer. Data were collected on a magnetic dipole with an Explorerium EM-832 spectrometer. The EM and magnetometer sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an RS-3000-83 Squared helicopter at a mean terrain clearance of 200 feet during the 10-10-2017 survey flight, with a spacing of a quarter of a mile. The line was flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Horizontal DGMS-C21 Coded Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a reference station of better than 0.1 m. Flight data positions were collected with the DGMS-C21 (UTM zone 5) system, 1983 North American datum using a carrier vector (CV) of 100, a north constant of 0 and an east constant of 268,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 900 of the first vertical derivatives of the magnetic field for the Farewell Survey Area dataset lie within the range displayed on the color bar. Data values outside range from -15,000 nT/m (dark blue) to about 7,000 nT/m (magenta).

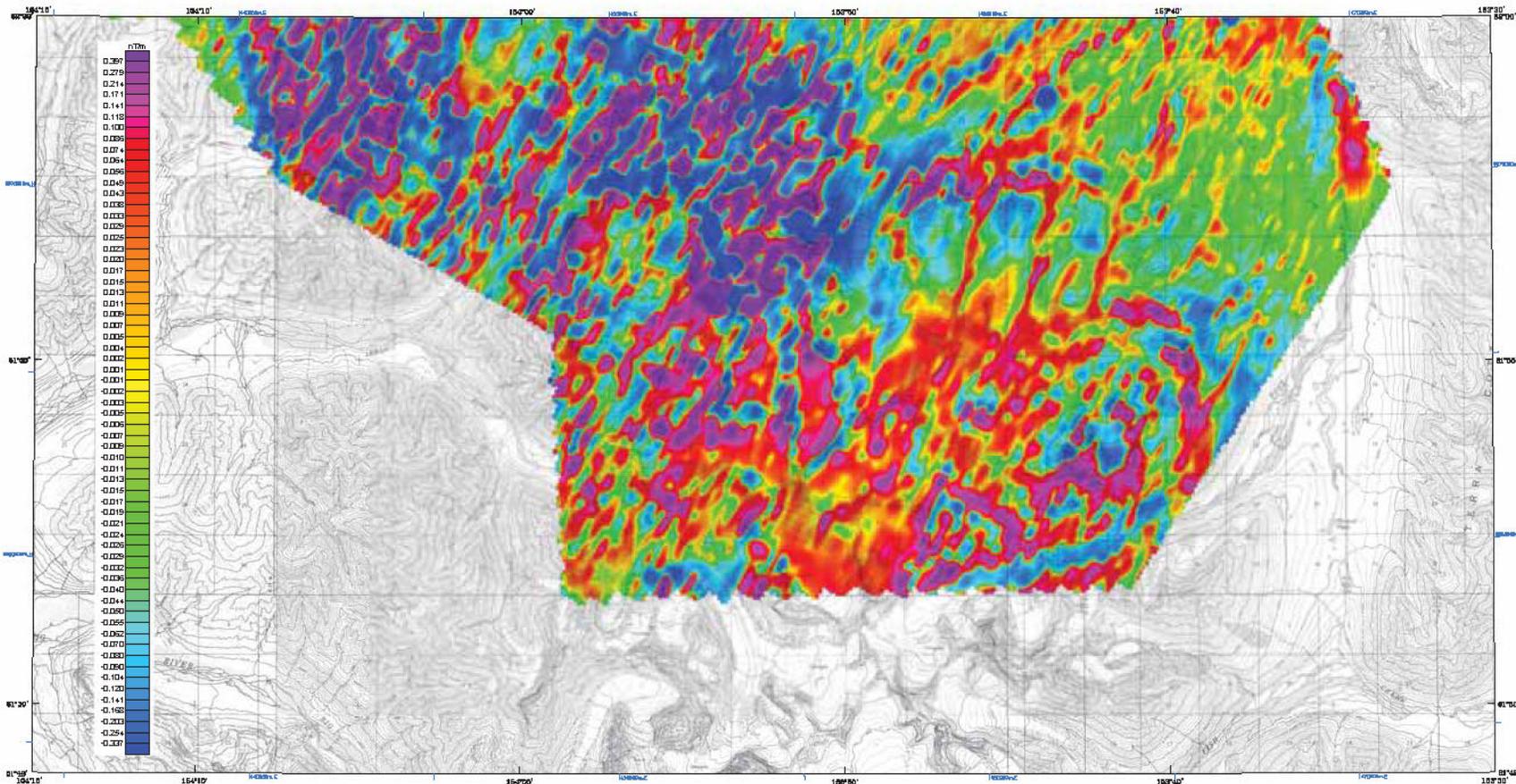
FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally resampled data from a Flujo D1244 magnetometer with a Schlumberger CS3 coil assembly. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variation by subtraction of the diurnally recorded base station magnetic data, (2) IIRF corrected (IIRF model (2010), updated for data of flight and altimeter positions), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 33 m cell size to produce the mag and fln1 grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

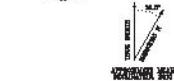
SURVEY HISTORY

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 Flujo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2015, 2013, and 2011. Previously, many DGGS surveys conducted in the current survey area shown in this location were by Ogeles Energy Services and other contractors. The project was funded by the Alaska State Department of Natural Resources and the Alaska Department of Geological & Geophysical Surveys as part of the Alaska Geospatial Inventory Program. Cook Inlet Region, Inc. (CIRI) subcontracted funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on a DVD for a central file through DGGS, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/usa). Maps are also available on paper through the DGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.

ALASKA, U.S. GEOLOGICAL SURVEY, BULLETIN 1432, A NEW METHOD OF INTERPOLATION AND WEIGHTED AVERAGE OF GEOPHYSICAL DATA, V. 17, NO. 4, P. 568-582.



DATE: 2014-08-20, TIME: 10:00 AM, PROJ: P-8, DATA: P-8, UTM, Zone: 18N, UTM, Contouring: 10m



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Schöner CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-B20 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters. GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the processed data is better than 10 m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 80% of the first vertical derivative of the magnetic field for the Wrangellia Survey Area dataset lies within the range displayed on the color bar. Data values actually range from -12,901 nT/m (dark blue) to about 2,987 nT/m (magenta).

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

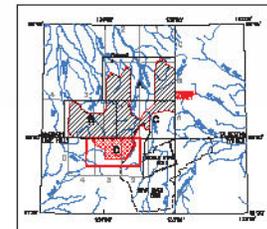
by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Schöner 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) GRF corrected (GRF model 2010, updated for data of flight and altimeter variations), (3) leveled to the sea line data, and (4) interpolated 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 25 m cell size to produce the maps and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

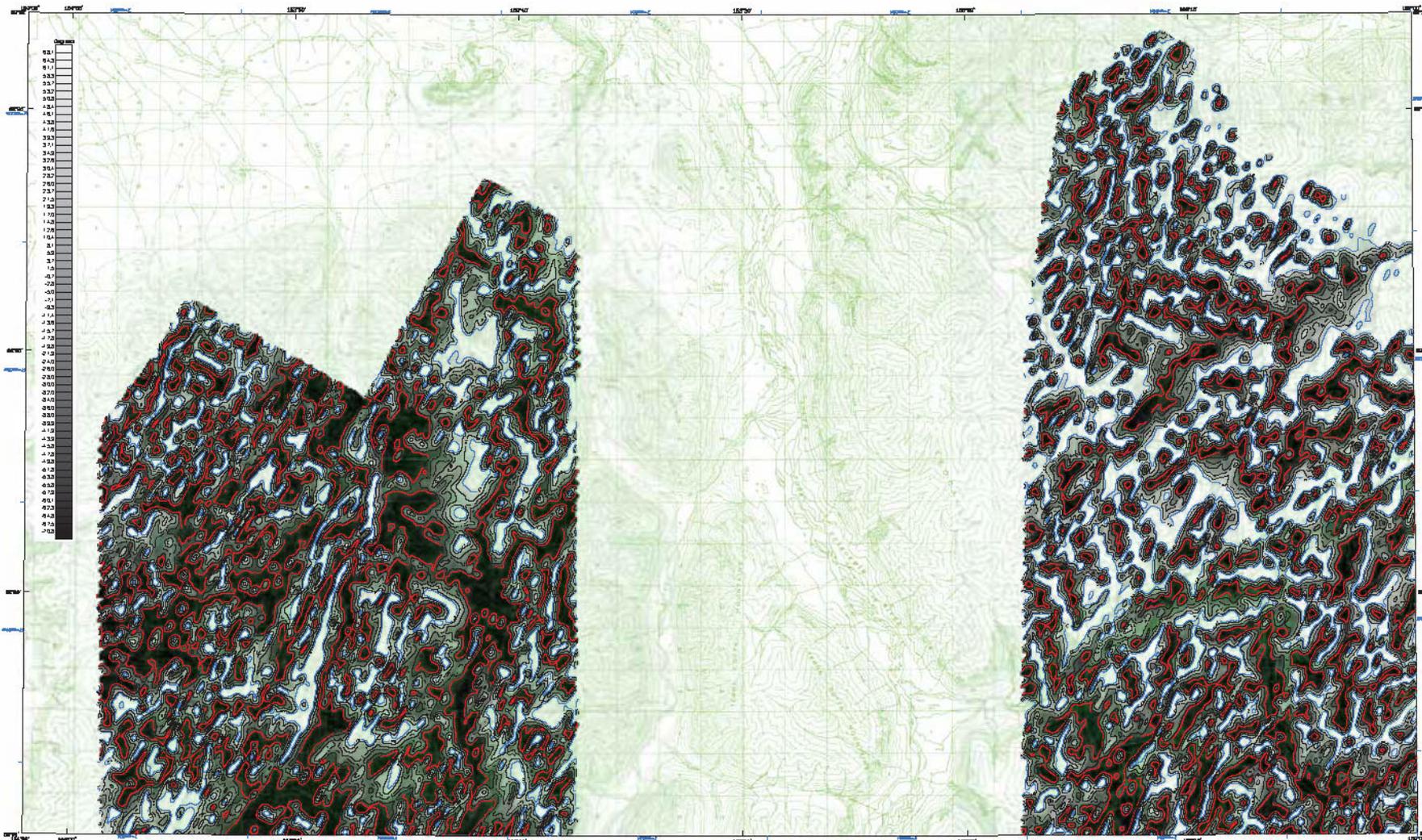
Alamo, H. 1970. A new method of interpolation and smooth curve fitting based on local polynomial approximations of the Association of Computing Machinery, v. 17, no. 1, p. 688-695.

LOCATION INDEX FOR 1:63,560-SCALE MAPS



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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG 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 Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Dillingham Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGG website (www.dggs.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.



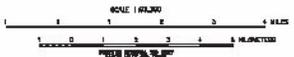
DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSPEC Electromagnetic (EM) system, a Fugro ORO magnetic gradiometer with a bottom 200 ocean sensor, and a Fugro Seismic 100-200 gravity-gradiometer. Some flights acquired the magnetic data with an Explorer 60-200 magnetometer. The EM and magnetic sensors were flown at a height of 100 feet, the gravity measurements were flown at a height of 200 feet, in addition to the magnetic topographic data from 100-200 feet. Contouring and projection errors, and the magnetic and topographic data were processed using a GEOSPEC 100-200 software package at a north-south resolution of 250 feet along 100-200 degree survey lines with a spacing of a quarter of a mile. These were then superimposed on the 1:50,000 map at intervals of approximately 2 miles.

A vertical 100-200 degree magnetic gradient was used for projection. The magnetic gradient was derived from a 100-200 degree magnetic differential contoured to a relative accuracy of better than 3 m. Topographic contours were projected onto the same base (UTM zone 50) as the 100-200 degree magnetic data using a digital elevation model (DEM) of 100-200 degree accuracy of the projected data is better than 10 m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE

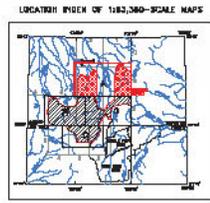
The tilt derivative is the angle between the horizontal gradient in the total gradient, which is useful for identifying the shape in type of anomaly. The tilt angle is positive over the anomaly, crosses through zero at or near the edge of a vertical edge anomaly, and is negative outside the anomaly region. It has the added advantage of responding equally well to whether the data increase or decrease to make deeper anomalies that may be masked by larger responses from shallower anomalies.



MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

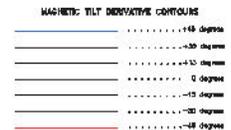
by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014

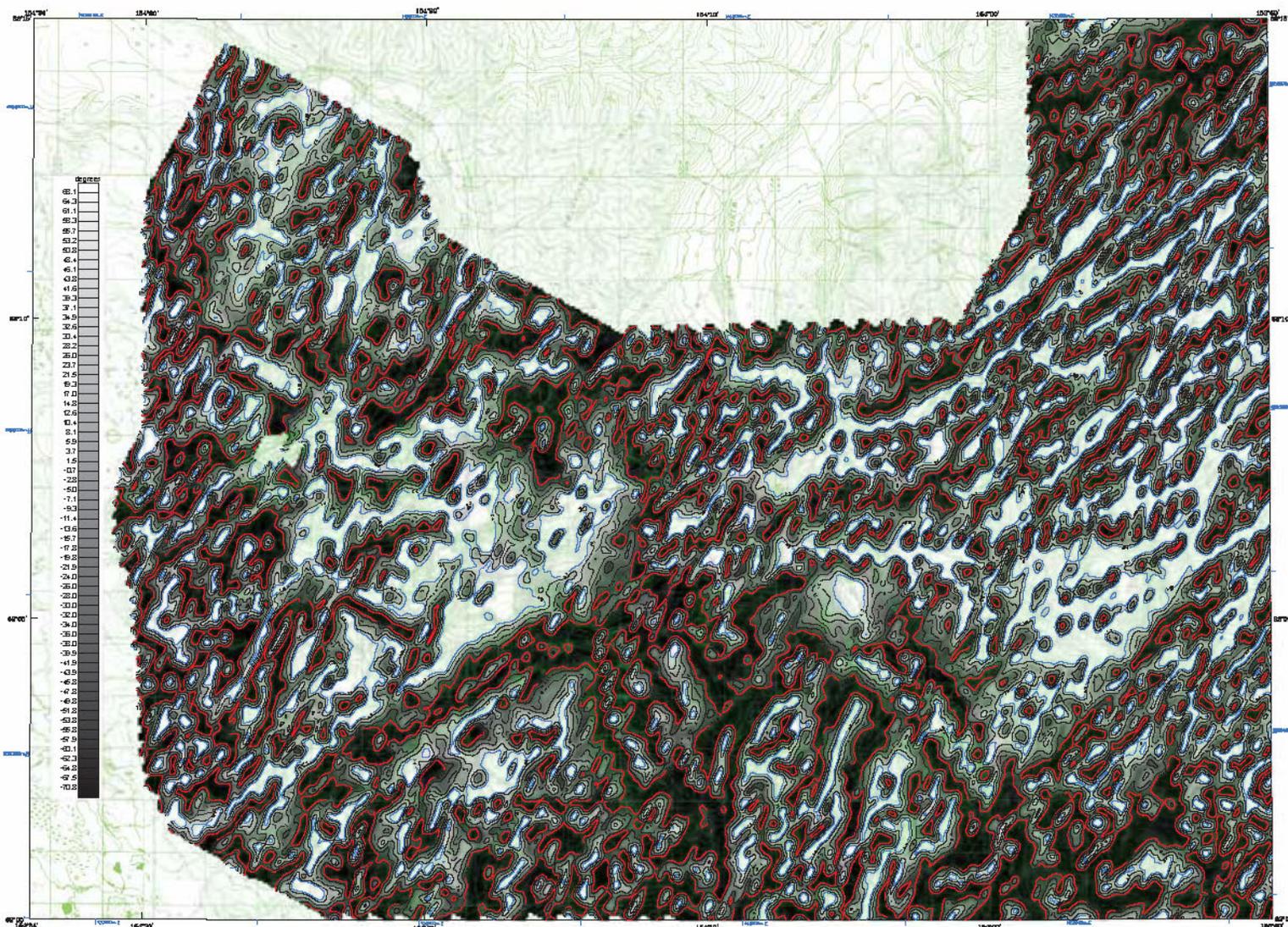


SURVEY HISTORY

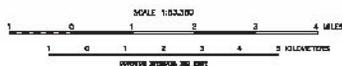
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. Previous years' DGGGS workbooks submitted to the current survey are shown in the location map by dashed lines, survey lines, and data of previous years are shown in the location map by dashed lines. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveying Program, Cook Inlet Region, Inc. (CIRI) contracted funding for a portion of the area.

All data and maps compiled to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3304 Delores Road, Fairbanks, Alaska, 99709, and are distributed for free over the DGGGS website (www.dgggs.state.ak.us/). Maps are also available on paper through the DGGGS office and are available with the maps in Adobe Acrobat PDF file format.

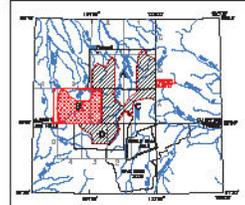




See also US Geological Survey sheets A-4, 1838, A-4, 1839, and A-4, 1841, Geographic Names.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DSDM24 Electromagnetics (EM) system, a Fugro D1-300 magnetometer with a Scripps 300 coilium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstarium RS-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 Super helicopter at a mean level of clearance of 2500 feet along NW-SE (20°) 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 OEM3-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential correction to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1987 North American datum using a central meridian (CM) of 153° 0 north azimuth, and a scale constant of 0.99999. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE

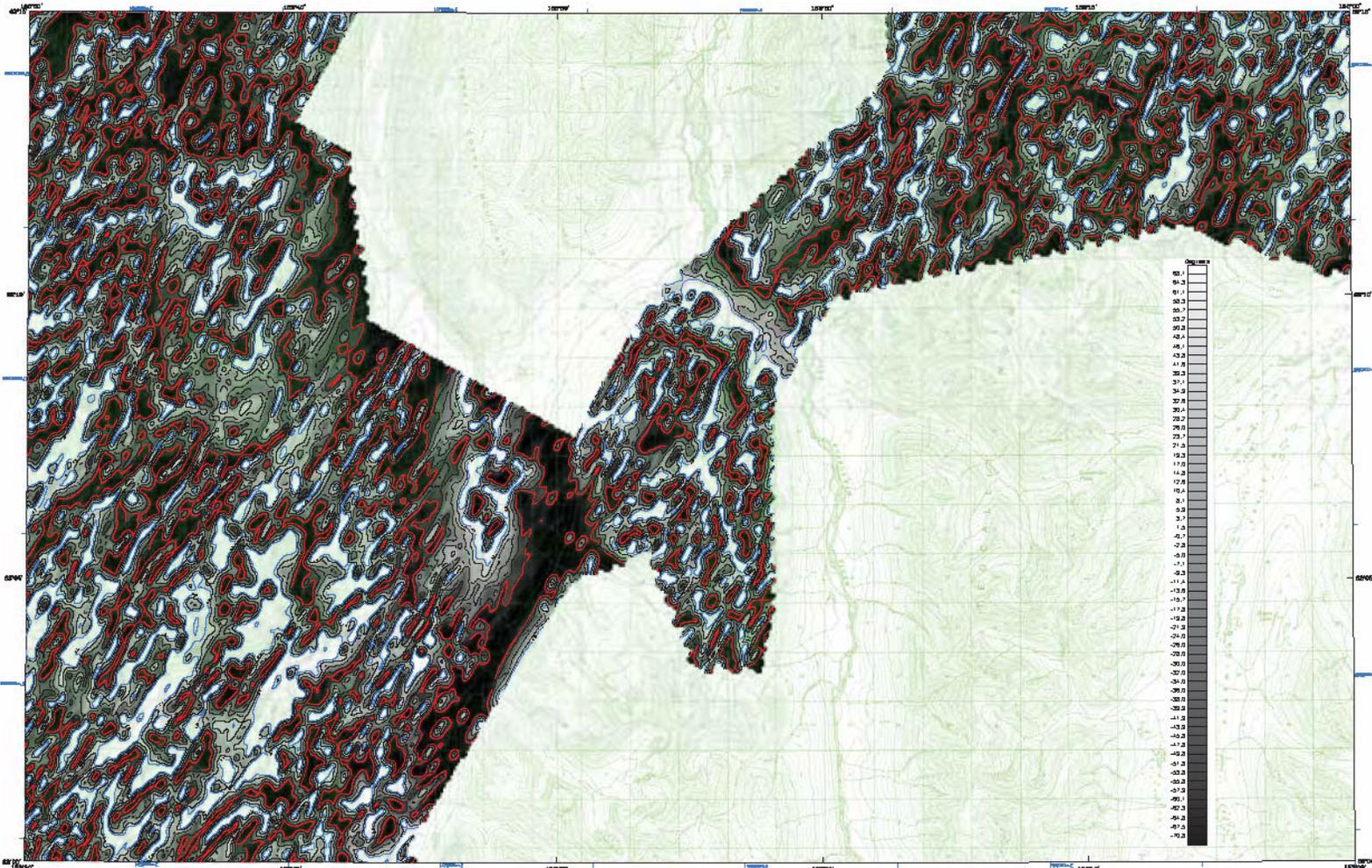
The DT derivative is the angle between the horizontal gradient & the total gradient, which is useful for defining the depth & type of source. The DT angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It 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

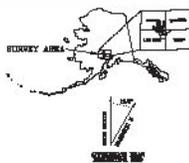
.....	446 degrees
.....	430 degrees
.....	410 degrees
.....	0 degrees
.....	-15 degrees
.....	-30 degrees
.....	-45 degrees

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. All former geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Previously flown DGGGS survey lines adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geological and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3364 College Road, Fairbanks, Alaska 99709-3707, 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 available online at the website in Adobe Acrobat PDF file format.

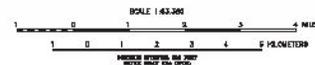


Scale: 1:43,360. Includes UTM grid lines and a north arrow.



DESCRIPTIVE NOTES
 The geophysical data were acquired with a GEOSPEC Electromagnetics (EM) system, a Fugro D1244 magnetometer with a Fugro C30 data system and a Rockwell Solutions RB-200 gamma-ray spectrometer. Some flight sections in the Farewell area were flown at an elevation of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an AS-350B-33 helicopter. Helicopter altimeter altimeter clearance of 200 feet during IM-2C (1207) survey flight with a spacing of a quarter of a mile. The three were taken perpendicular to the flight lines at intervals of approximately 3 miles.
 A Fugro D1244-321, Chief Positioning System was used for navigation. The helicopter positions were observed every 6-10 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were corrected using the CORS (Trimble CORS 6) reference, 1927 North American datum using a vertical correction (Cv) of 137.7, a north correction of 0 and an east correction of 268.000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

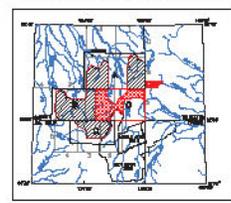
MAGNETIC TILT DERIVATIVE
 The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for locating the origin & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the same sign as the magnetic anomaly. It has the same sign as the magnetic anomaly and is able to resolve deeper sources that may be masked by larger responses from shallower sources.



MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA
 PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro Geoservices, Inc.
 2014

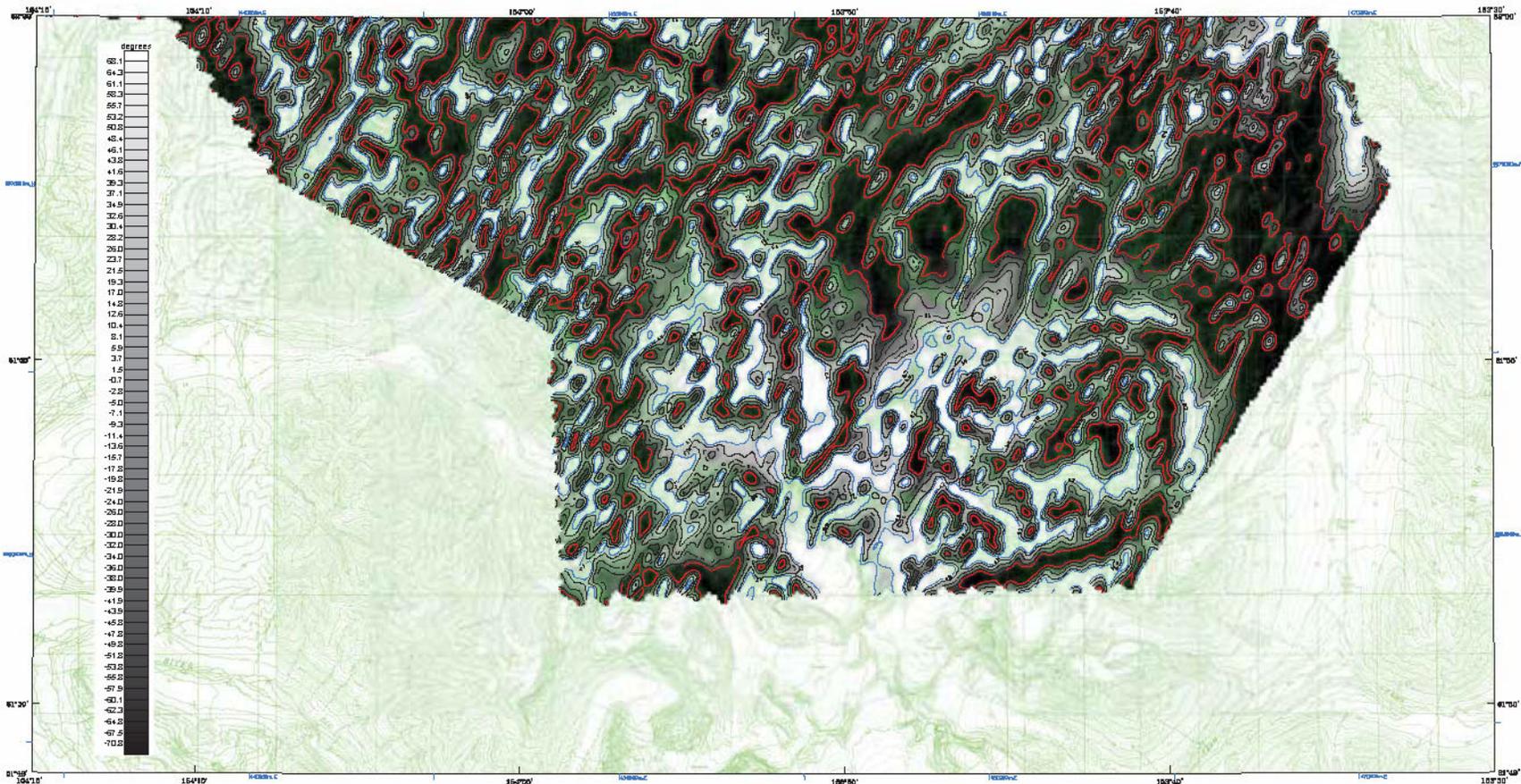
LOCATION INDEX FOR 1:43,360-SCALE MAPS



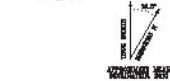
MAGNETIC TILT DERIVATIVE CONTOURS

Blue	+15 degrees
Light Blue	+10 degrees
White	+5 degrees
Light Green	0 degrees
Light Yellow	-5 degrees
Yellow	-10 degrees
Orange	-15 degrees

SURVEY HISTORY
 This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2010, 2013, and 2014. Previously, many DGGGS surveys conducted to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Geospatial Information and Data Management Program, Alaska Assessment project, which is part of the Alaska State Geospatial and Geophysical Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work.
 All data and maps produced to date from DGN survey are available in digital format on DVD for a nominal fee through CGG, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/usa/). Maps are also available on paper through the DGGGS office, and are available online at the website in Alaska, and the website index at the website in Alaska, and the website.



DATE: 08/14/14, TIME: 10:00 AM, PROJECT: 14-001, SHEET: 1 OF 1, SCALE: 1:63,560, MAP: 14-001-1, TITLE: MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Spintec CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 100- to 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Eight north positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE

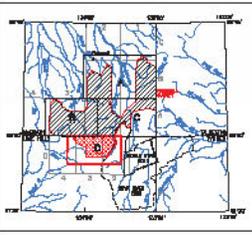
The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, passes through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. 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 WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

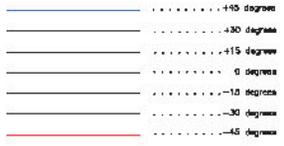
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

LOCATION INDEX FOR 1:63,560-SCALE MAPS

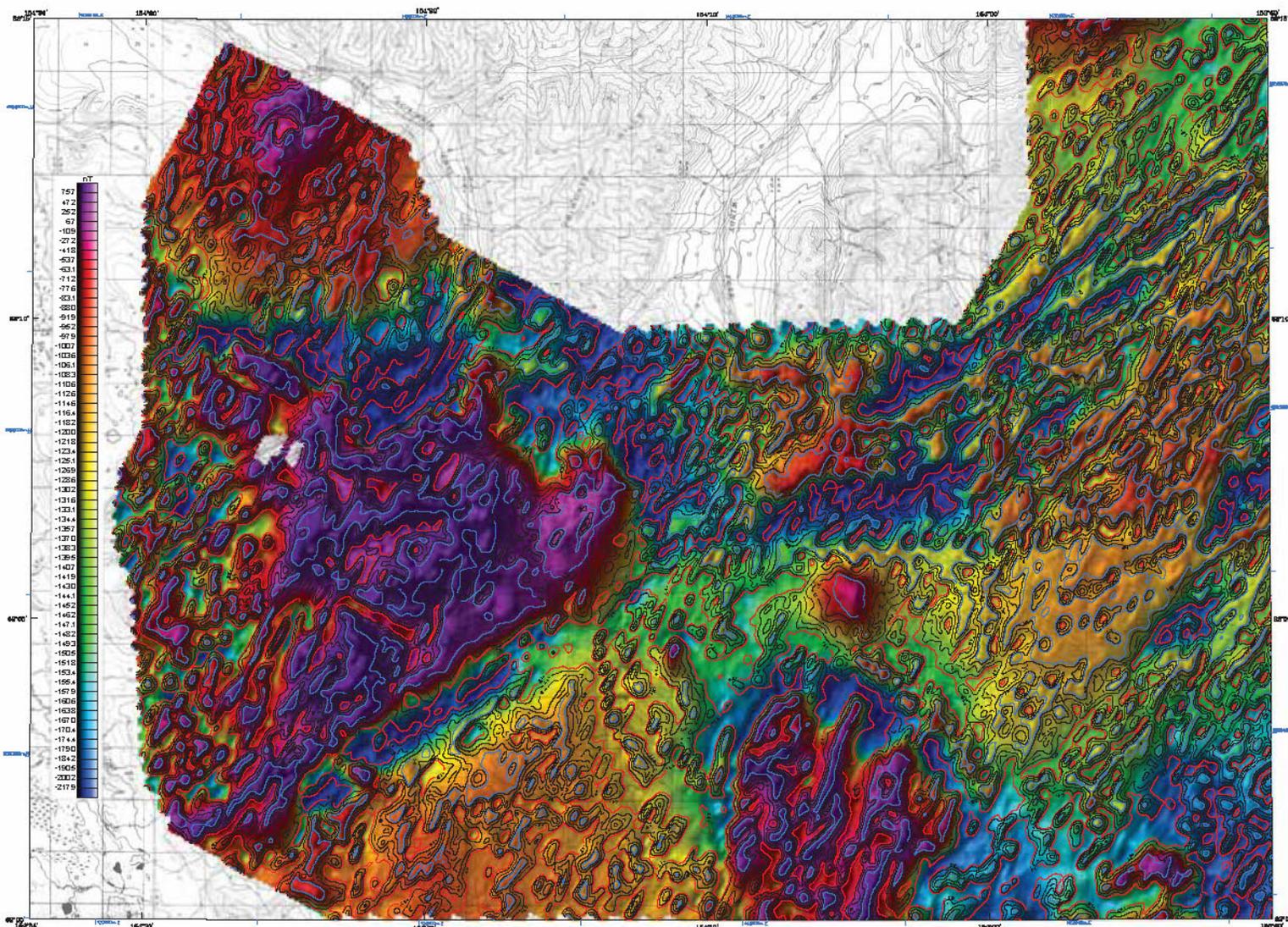


MAGNETIC TILT DERIVATIVE CONTOURS

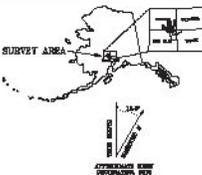
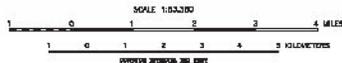


SURVEY HISTORY

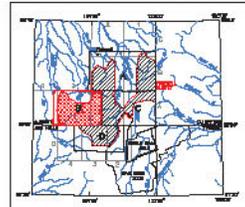
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3354 Collins Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGG website (www.dggs.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.



See Item 118, Redefined Survey Section, A-C, 1998, A-D, 1999, Sections A-C, 1991, Geographic Data.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



**COLOR SHADOW RESIDUAL MAGNETIC FIELD
WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES**

by
Laurie E. Burns, OGS, and Fugro Geoservices, Inc.
2014

Sun Azimuth: 300 degrees; Sun Inclination: 45 degrees

RESIDUAL MAGNETIC FIELD

The magnetic field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scripps 320 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstarium RS-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters, and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS380-B1 Superkub helicopter at a mean barolo clearance of 2500 feet along NW-SE (120°) 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 OEM3-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1987 North American datum using a central meridian (CM) of 152°, a north coordinate of 0 and an east coordinate of 600,000. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

Alaska, U.S. GEOLOGICAL SURVEY, A new method of interpretation and analysis using digital magnetic data at the assessment of Computer Technology, v. 12, no. 4, p. 286-302.

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 deep sources that may be masked by larger responses from shallower sources.

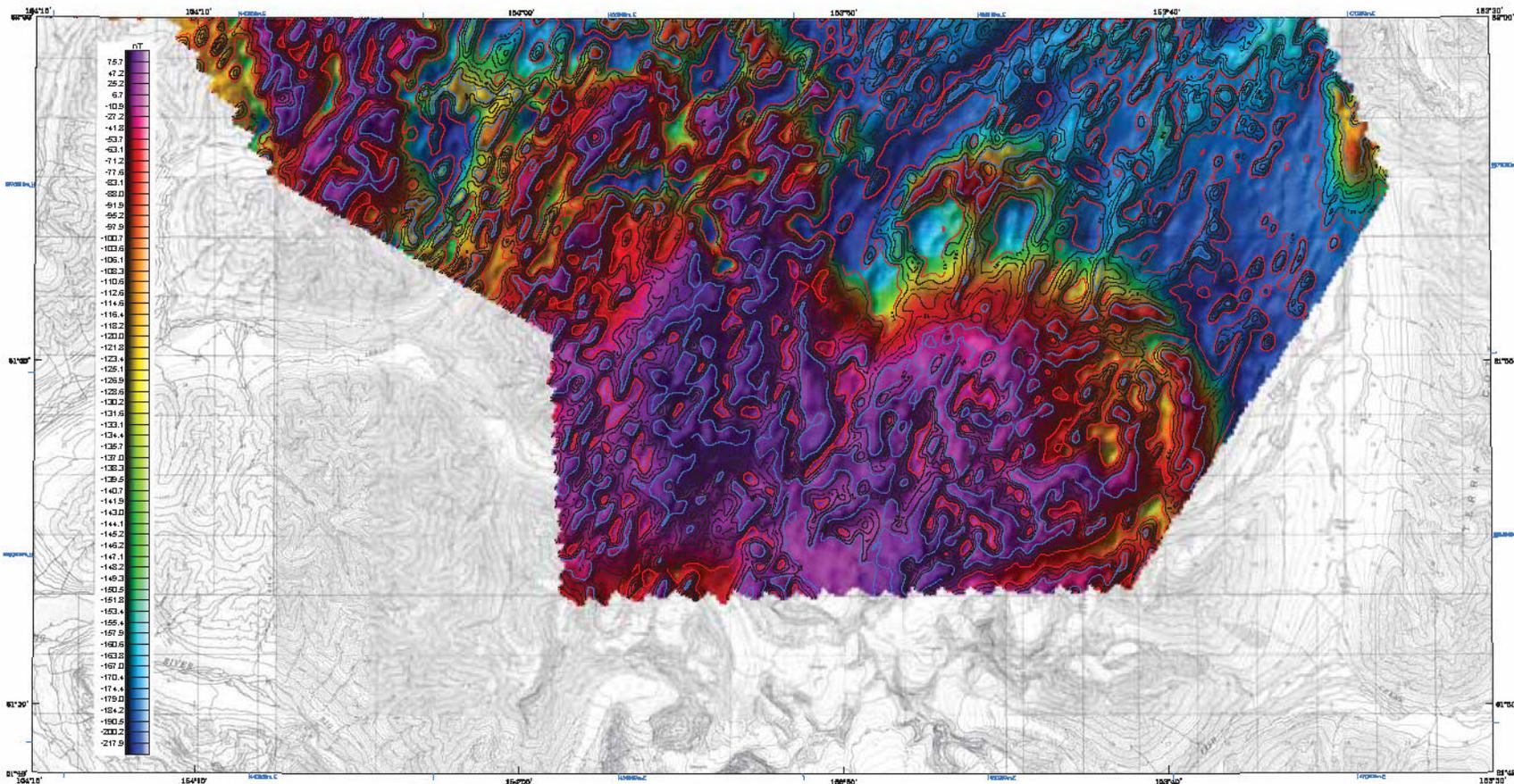
MAGNETIC TILT DERIVATIVE CONTOURS



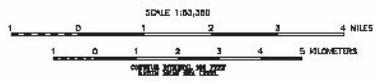
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. Alaska geophysical data for the area were acquired and processed by DGG in 2012, 2013, and 2014. Fugro's former DGGGS surveying contract to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Division of Geological and Geophysical Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

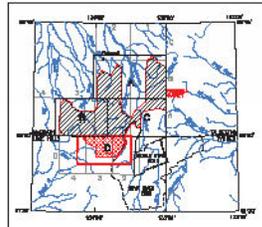
All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov). Maps are also available on paper through the DGGGS office,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



DATE: 2014-05-05, TIME: 10:00 AM, UTM ZONE: 18Q, UTM X: 7770, UTM Y: 5, UTM Z: 1000, CONTOURING: 100 nT



LOCATION INDEX FOR 1:63,560-SCALE MAPS



COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

Sun Azimuth: 300 degrees; Sun Inclination: 45 degrees

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1000' x 1000' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Saitex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010), updated for date of flight and altimeter (variance), (3) leveled to the tie line data, and (4) interpolated into a regular 60 m grid using a modified Akima (1970) technique. All grids were then resampled from the 90 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alaska, N. 1875. A new method of stereoblock and emphasis curves (with notes on local projections) Journal of the Association of Geographers, No. 10, p. 4, 408-409.

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.

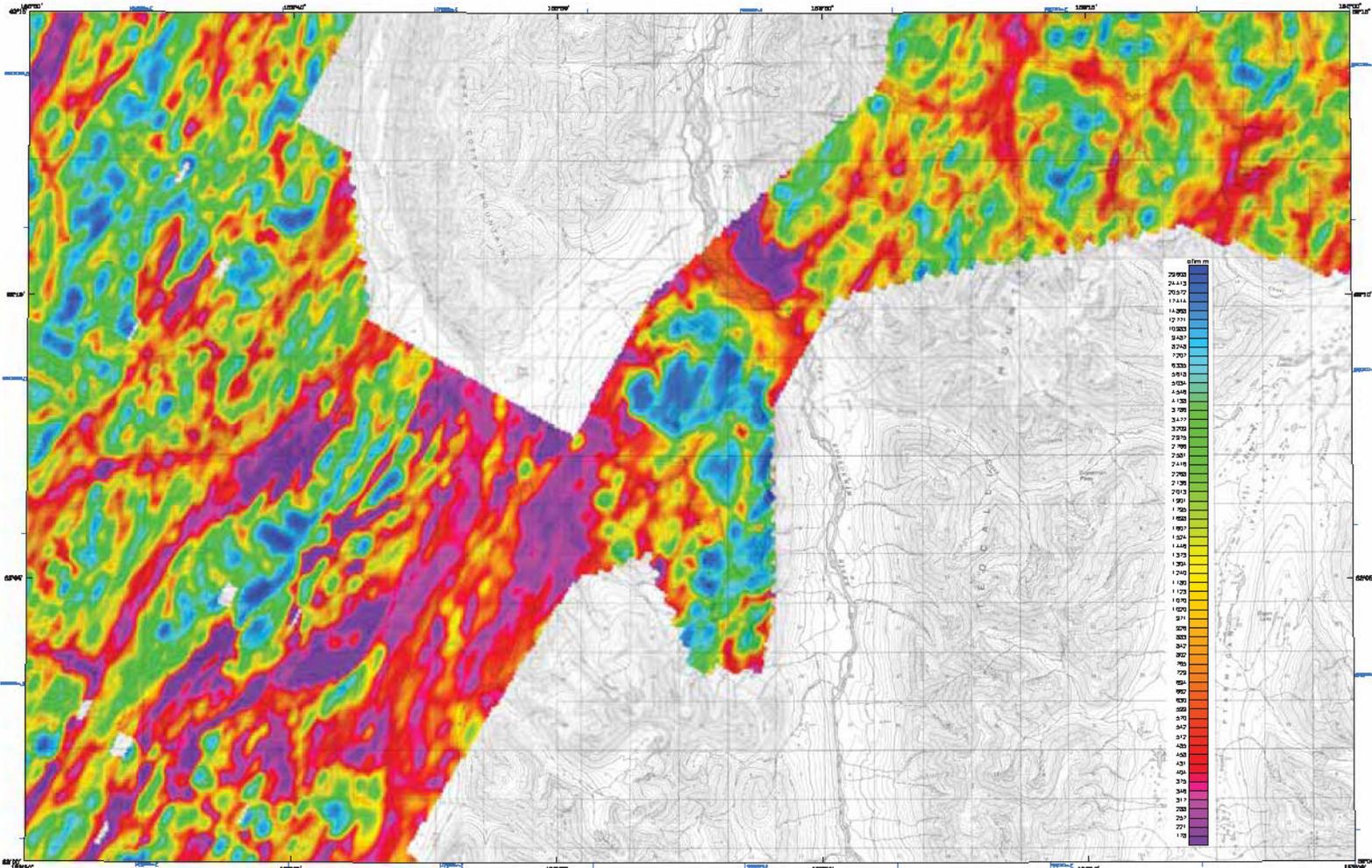
MAGNETIC TILT DERIVATIVE CONTOURS



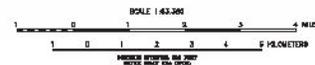
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 Chitina 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.

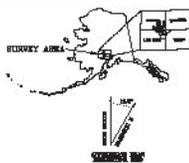


Scale from U.S. Geological Survey (Smith et al., 1984, p. 4, 1984, Washington, Alaska)



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Lance E. Burns, CGG, and Flugo Geoservices, Inc.
2014



DESCRIPTIVE NOTES

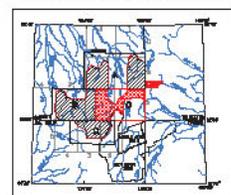
The geophysical data were collected with a GEODEV Electromagnetics (EM) system, a Flugo D1244 magnetometer with a Flugo 020 control panel and a Rodentek Solutions RB-200 gamma-ray spectrometer. Data files include the raw geophysical data with an Explorerium EM-832 spectrometer. The EM and magnetometer were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an AS-350B-33 helicopter. All control alt is mean terrain clearance of 200 feet along IM-92 (1977) 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 General DEMS-C21, Chief Packaging System was used for packaging. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the CORS (1984 UTM zone 5) system, 1983 North American datum using a ground station (GS) of 100.0 north-south of 0 and an east constant of 200,000. Profiled contours of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The GEODEV EM system measured in-phase and quadrature components at the transmitter. The vertical double-dipole operated at 5000 and 5600 Hz while the horizontal coil pair operated at 832, 7200 and 96,000 Hz. EM data were acquired at 0.1 second intervals. The EM system records in backscatter, in-phase, quadrature, and total magnetic moment. Apparent resistivity is calculated from the in-phase and quadrature components of the system. 50,000 Hz resistivity data were collected using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the CORS (1984 UTM zone 5) system, 1983 North American datum using a ground station (GS) of 100.0 north-south of 0 and an east constant of 200,000. Profiled contours of the presented data is better than 10 m with respect to the UTM grid.

LOCATION INDEX FOR 1:63,360-SCALE MAPS

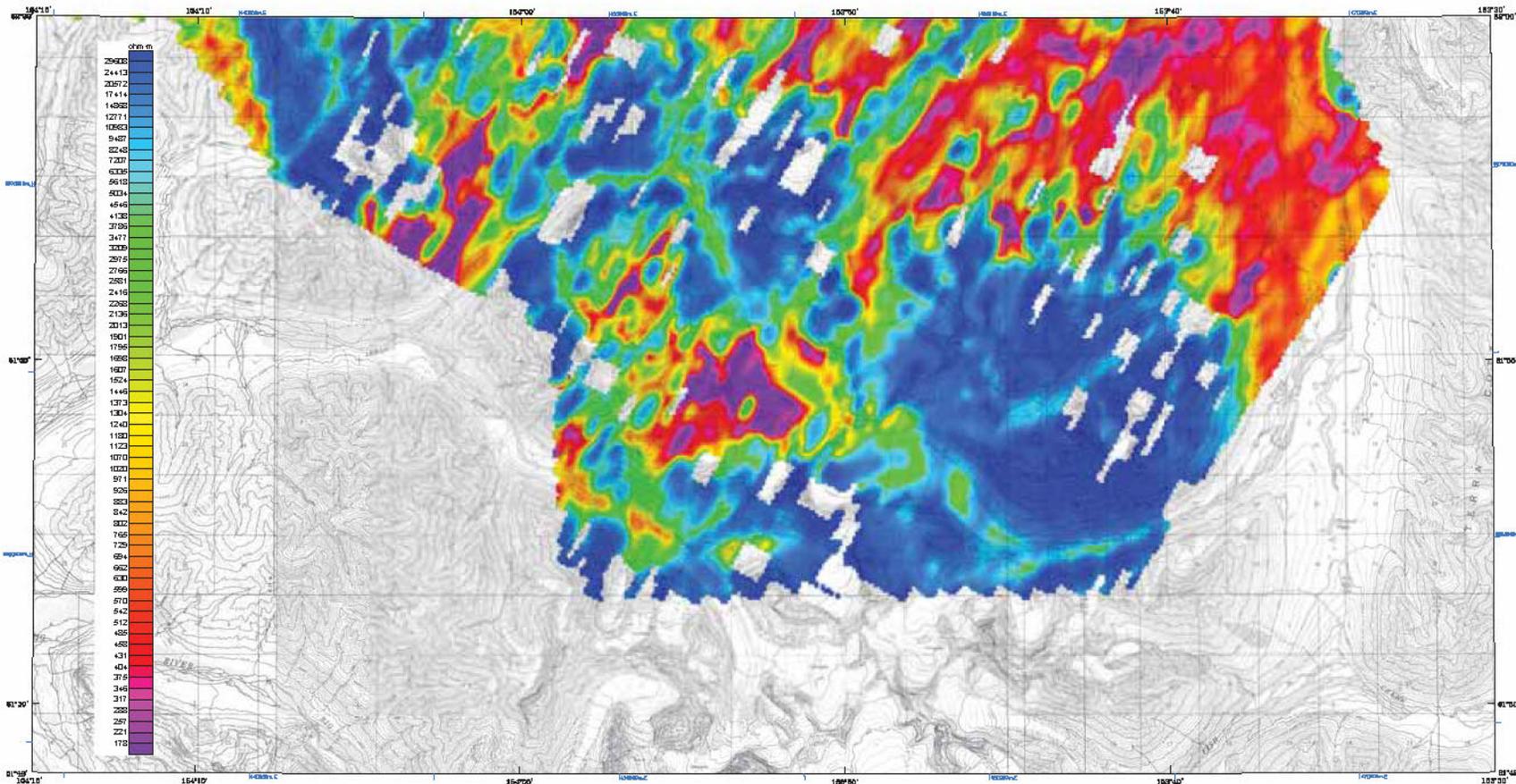


RESISTIVITY ALTITUDE LIMITS

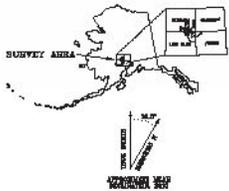
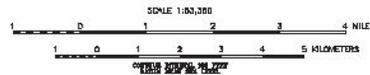
In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This occurs where the resistivity calculations due to small signals where the helicopter has higher to over current capacity or low signal-to-noise. Data points in the grid were created where some of the flight corridors were more than one survey line. Sparse grid values may be present after the merging of the gridded data from the 80 m to the 25 m cell size at the grid edge and are an artifact of the grid merging. These values at edge of the grid lines due to flight height should be viewed with caution.

SURVEY HISTORY

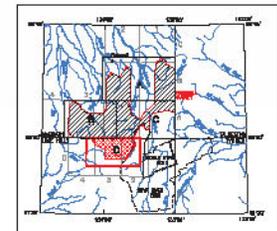
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Flugo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2012, 2013, and 2014. Processing history DGGG surveys conducted to the current survey are shown in the location index by dashed lines, survey routes, and date of publication. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska Airborne Geophysical and Geophysical Inventory Program. Cook Inlet Region, Inc. (CIRI) conducted funding for a portion of the area. All data and maps produced to date from this survey are available in digital format in a central file through DGGG, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGG website (www.dggg.alaska.gov/links). Maps are also available on paper through the DGGG office, and are available online at the website in Adobe Acrobat (.PDF) format.



DATE: 2014-08-28, TIME: 10:00 AM, PROJ: 14-02, P-S: 2774, P-S: 1.0, UTM
 DATE: 2014-08-28, TIME: 10:00 AM, PROJ: 14-02, P-S: 2774, P-S: 1.0, UTM



LOCATION INDEX FOR 1:63,360-SCALE MAPS



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium atomic error, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-B20 spectrometer. The EM grid magnetic bearings were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters. GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1000' (1.250') 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DIGHEMY EM system measured in-phase and quadrature components of low frequency. Two vertical coplanar coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 500, 7200 and 58,000 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 20 m cell size to produce the maps and final grids contained in this publication.

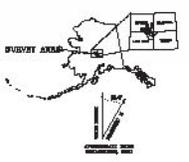
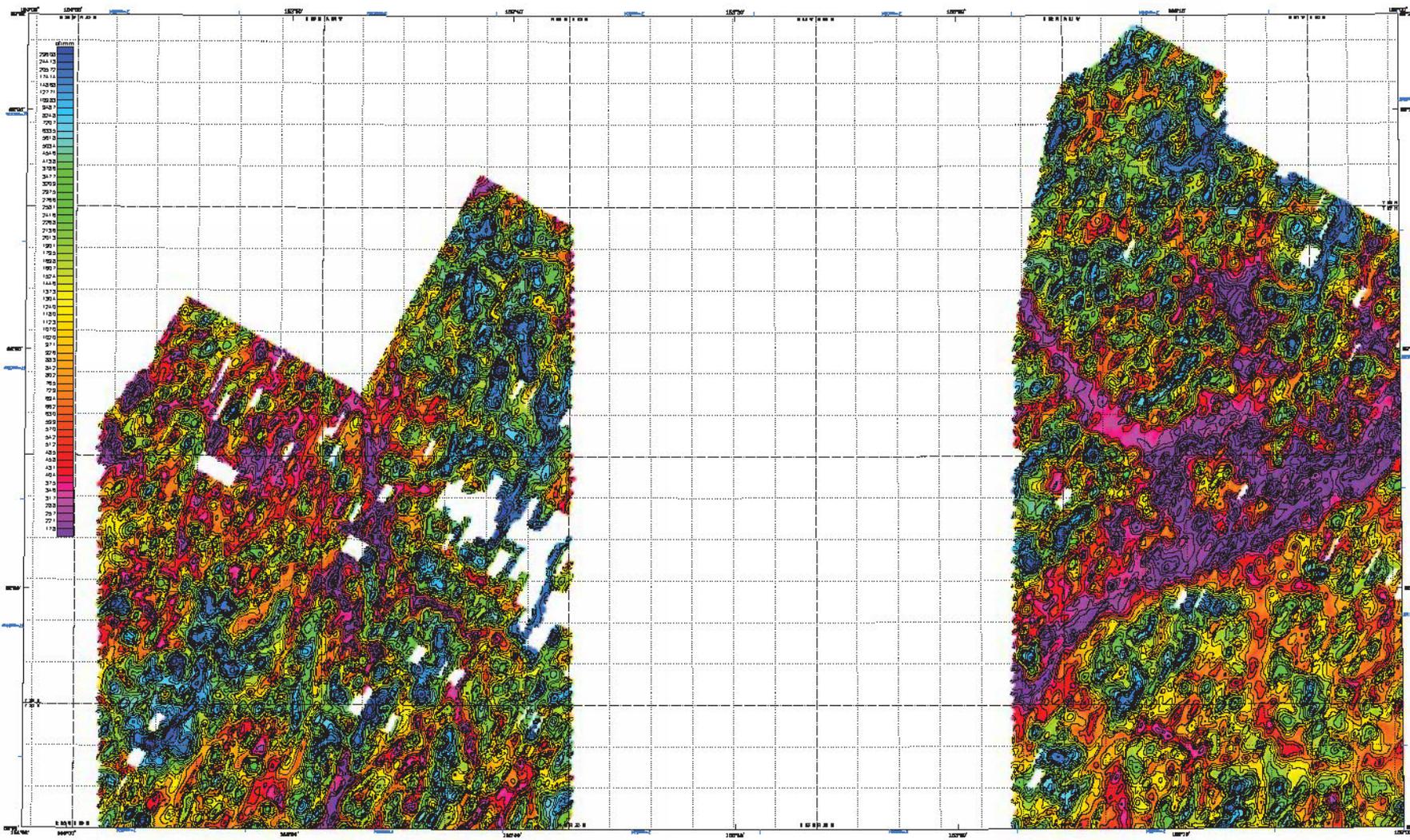
Alaska, R. 1876. A new method of interpolation and smooth curve fitting based on local polynomial splines of the distribution of Chebyshev Nodes, p. 17, no. 4, p. 488-500.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small areas 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. Sparse grid values may be edited after the resampling of the gridded data from the 80 meter to the 20 meter cell size at the grid edge and one on either side of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins 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 effort and are viewable online at the website in Adobe Acrobat PDF file format.



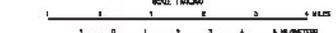
DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro Global magnetotelluric with a modified TCS custom sensor, and a Precision Systems (PS) 2000 transmitter system. Some flights acquired the resistivity data with an Explorer-60-200 system. The EM and magnetotelluric surveys were flown at a height of 100 feet, the geometry measurements were flown at a height of 200 feet, in addition to the survey (topographic) data from Polar 3000 GPS receivers and Vexcel compact flightline were performed on the 2000-2003 flightline. Contour interval is 100 ohm-meters. Contour interval at a single terrain elevation of 200 feet above 100-200 feet above 200 feet, with a spacing of a quarter of a mile. The data were then interpolated to the flight line at intervals of approximately 2 miles.

A Fugro Global-2000 Global Magnetotelluric System was used for magnetotelluric. The magnetotelluric system was a modified TCS custom sensor with a modified TCS custom sensor. The magnetotelluric system was a modified TCS custom sensor with a modified TCS custom sensor. The magnetotelluric system was a modified TCS custom sensor with a modified TCS custom sensor.

RESISTIVITY

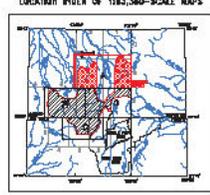
The DISIR™ EM system measured in-phase and quadrature components of the frequency induced magnetic field at 56,000 Hz. The data were corrected for terrain effects and were converted to a resistivity scale. The resistivity scale was derived from a series of calibration flights over a range of terrain elevations. The resistivity scale was derived from a series of calibration flights over a range of terrain elevations.



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

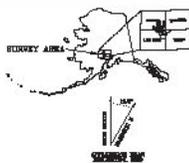
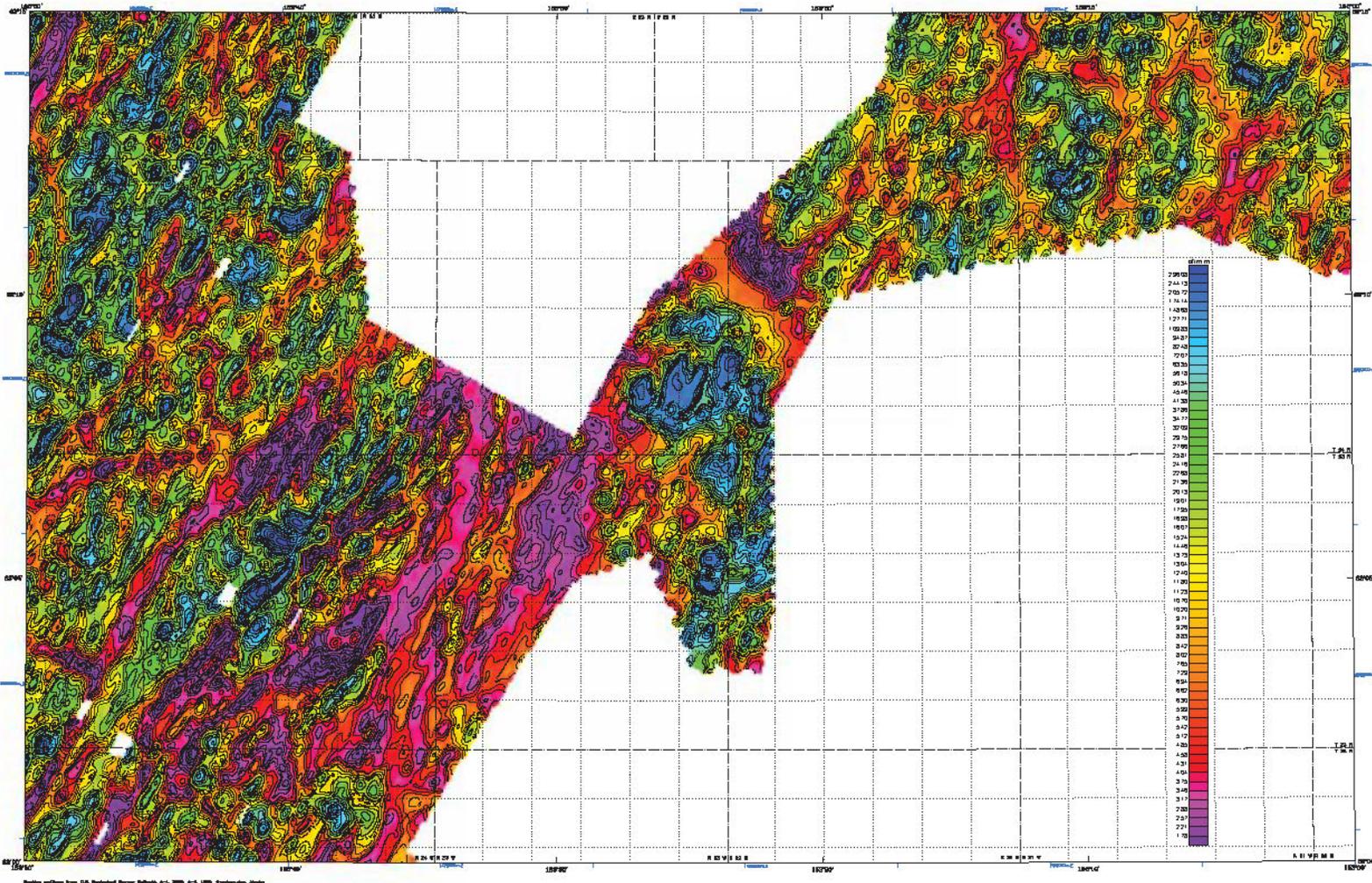
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGG and Fugro GeoServices, Inc.
2014



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 CGG in 2012, 2013, and 2014. The current survey was flown in the location of the Farewell Survey area, and data were processed. The project was funded by the Alaska State Department of Natural Resources and the Alaska Department of Natural Resources, which is part of the Alaska Airborne Geophysical and Geophysical Magnetotelluric Inventory Program. Data were acquired by Fugro GeoServices, Inc. (Fugro) in 2012, 2013, and 2014. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3300 Delgada Road, Fairbanks, Alaska, 99709-0001, and are distributed for free with the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office and are available with the maps in Alaska Annotator PDF file format.



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Larrel E. Burns, CGS, and Flugo Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were collected with a GEODEX Electromagnetics (EM) system, a Flugo D1344 magnetometer with a battery (BA) control system and a Rodentek Solutions RB-200 gamma-ray spectrometer. Data files include the raw EM data sets on Expeditionary CD-ROM spectrometer. The EM and magnetometer were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an RS-300-83 Squared helicopter at a mean terrain clearance of 200 feet along the 100-200 (100) 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 General Dynamics-CAL Clebed Positioning System was used for navigation. The helicopter positions were obtained every 6-3 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were obtained using the Global Positioning System (GPS) system, 1983 North American datum using a spherical coordinate system of 100,000 feet and a scale constant of 268,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The GEODEX EM system measured in-phase and quadrature components at the frequencies. The vertical component could only be collected at 100 and 5000 Hz while the horizontal component data were collected at 100, 7000 and 24,000 Hz. EM data were acquired at 0.1 second intervals. The EM system measures in-phase, quadrature, conductive induction, and induced voltage. Apparent resistivity is calculated from the in-phase and quadrature components of the response. A 100 m pseudo-layer half space model is used to convert the data into a regular 60 m grid using a modified Ahno (1970) technique. All grids were then resampled from the 60 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

NOTE: FIG. 1206-A uses method of interpretation and ground terms of Geophysical Handbook, v. 17, p. 4, p. 120-121.

RESISTIVITY ALTITUDE LIMITS

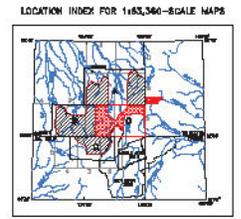
In areas where the EM bird height exceeded 150 m, resistivity was not collected. This article maps resistivity distributions due to wind speed where the helicopter flew higher to avoid cultural objects or for safety reasons. Some areas in the grids were created where areas of high flying consisted over more than one survey line. Surface grid values may be subject to the accuracy of the ground data from the 80 meter to the 30 meter cell size at the grid edges and are a result of the grid resampling. There are a few areas of the grid lines due to flying height should be viewed with caution.

RESISTIVITY CONTOURS

1000
800
600
400
300
200
150
100

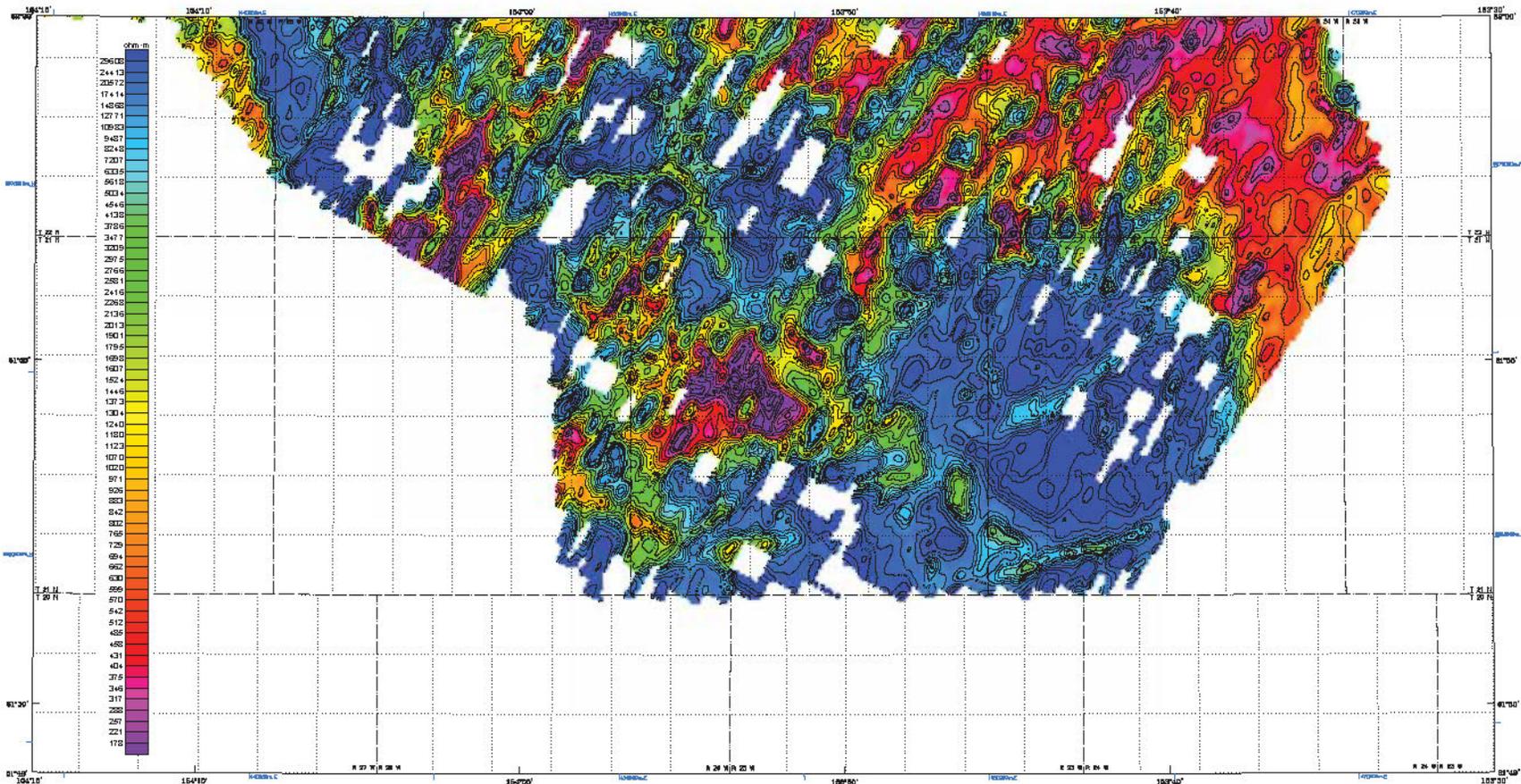
Contours in intervals of 10 intervals per decade

..... resistivity bar

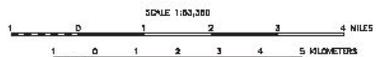


SURVEY HISTORY

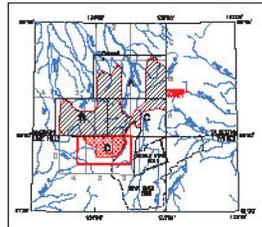
The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Surveys (DGRS), and Flugo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGS in 2013, 2013, and 2014. Previously, Flugo Geoservices, Inc. collected and processed the current survey data shown in this location by Flugo Geoservices, Inc. and data of publication. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Department of Natural Resources and Geophysical Surveys Assessment Program. Cook Inlet Pipeline, Inc. (CIP) collected and processed the data from the survey. All data and maps produced to date from this survey are available in digital format in DGRS for a central file through DGRS, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGRS website (www.dgrs.state.ak.us/). Maps are also available on paper through the DGRS office, and are available online at the website in Adobe Acrobat PDF format.



Geophysical Data: 56,000 Hz Coplanar Apparent Resistivity
 Date: 2014-2-9D
 Scale: 1:63,560



LOCATION INDEX FOR 1:63,560-SCALE MAPS



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium atomic sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploration GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 100-m (1200') 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DIGHEMY EM system measured in-phase and quadrature components of the frequency. The vertical spatial cell-size operated at 1000 and 5500 Hz with three horizontal coplanar cell-pairs operated at 500, 7200 and 25,000 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 20 m cell size to produce the maps and final grids contained in this publication.

Alaska, N. 1976. A new method of interpolation and smooth curve fitting based on local polynomial splines. *Journal of the Association of Computing Machinery*, v. 12, no. 4, p. 481-491.

RESISTIVITY ALTITUDE LIMITS

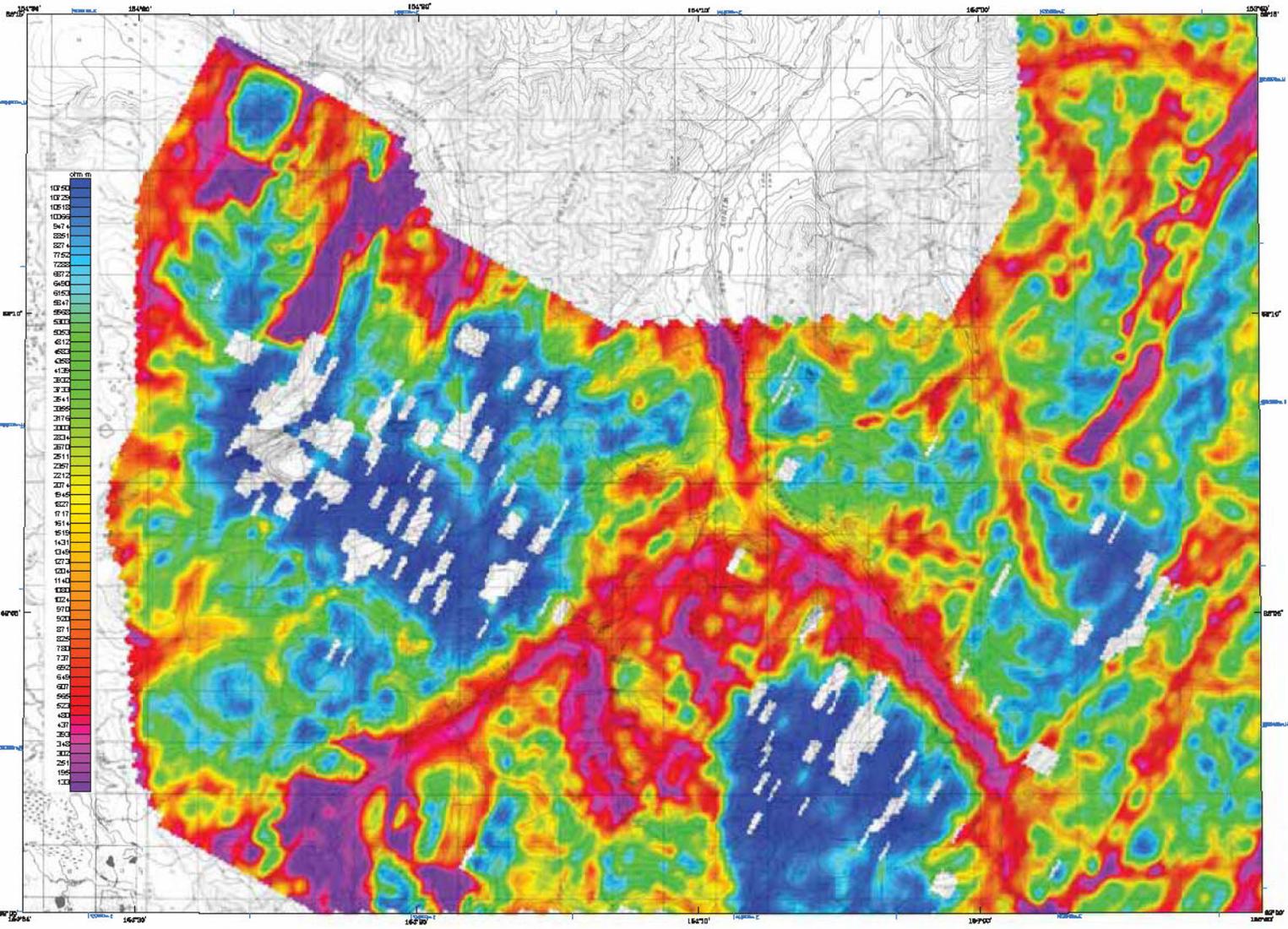
In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to aerial signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line. Significant grid values may be present over the boundaries of the gridded data from the 80 meter to the 20 meter cell size at the grid edges and on an oroblot at the grid northeast. These values at edges of the grid holes due to flying height should be viewed with caution.



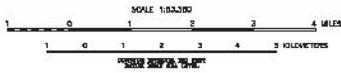
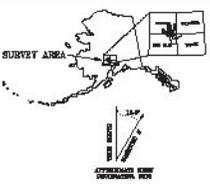
SURVEY HISTORY

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and dates of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Cultural Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins Road, Fairbanks, Alaska, 99701-3707, 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.



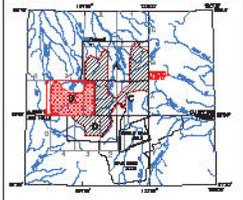
See Item 218, Geophysical Survey Methods, A-C, 1988, A-D, 1989, Methods A-4, 1991, Geophysical Atlas.



**7200 Hz COPLANAR APPARENT RESISTIVITY
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geoservices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetics (EM) system, a Fugro D1 base magnetometer with a Scripps 300 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the resistometric data with an Explorerium 2R-320 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 SuperPuma helicopter at a mean barolo clearance of 2500 feet along NW-SE (120°) 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 OEM3-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 3 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 153° 0' north-south, of 0 and an east constant of 600,000. Fractional 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 coplanar coil-pairs operated at 1000 and 5500 Hz with three horizontal coplanar coil-pairs operated at 700, 7500 and 26,000 Hz. EM data were acquired at 0.1 second intervals. The EM system response to bedrock outcrops, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the vector 56,000 Hz with the pseudo-layer half space model. The data were interpreted into a regular 80 m grid using a modified Alumba (1978) 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.

ALUMBA, M. (1978) A new method of interpretation and anomaly fitting using an exact procedure applied to the observation of Complex Resistivity, p. 117-124, p. 288-300.

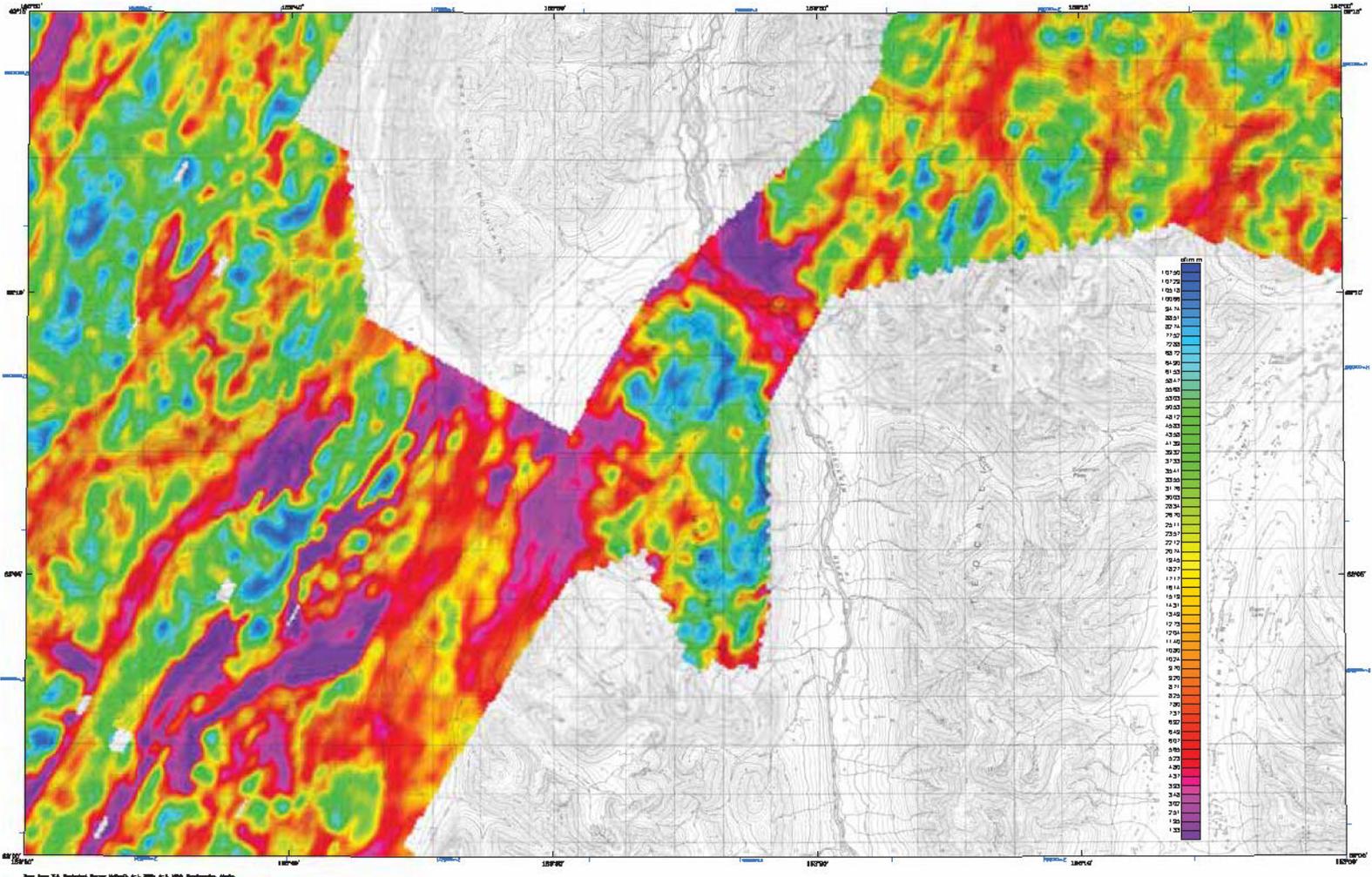
RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This occurs in areas where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where some of the flight corridors were more than the summing of the grid size from the 10 meter to the 25 meter cell size of the grid edges and one or several of the grid summing. These values at edge of the grid holes due to flying height should be viewed with caution.

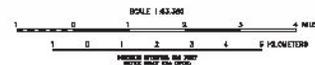
SURVEY HISTORY

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 DGG in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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

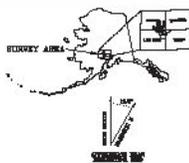


State of Alaska, Geological Survey, Fairbanks, Alaska, 2014



**7200 Hz COPLANAR APPARENT RESISTIVITY
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Lance E. Burns, CGG, and Flujo Geoservices, Inc.
2014



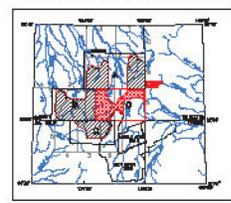
DESCRIPTIVE NOTES

The geophysical data were acquired with a DEHEM® Electromagnetics (EM) system, a Flujo D1244 magnetometer and a Flujo RB-200 control system and a Rodent Solutions RB-200 ground-coupled magnetometer. Data were collected in the FAREWELL area with an EarthSonic EM-330 spectrometer. The EM and magnetometer were flown at a height of 100 feet. The ground-coupled magnetometer was flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimetry and video cameras. Flights were performed with an AS-350B-33 helicopter. The helicopter was flown at a mean terrain clearance of 200 feet along IM-92 (1977) 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 DEHEM EM-330 Coiled Processing System was used for processing. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were collected using the Global Positioning System (GPS) 1983 North American datum using a Garmin receiver (G1) of 100.0 north correction of 0 and an east constant of 268,000. Position accuracy of the processed data is better than 10 m with respect to the UTM grid.

RESISTIVITY
The DEHEM® EM system measured in-phase and quadrature components at the transmitter. The vertical coil-off-axis operated at 1000 and 5000 Hz while the horizontal coil-off-axis operated at 800, 7200 and 96,000 Hz. EM data were acquired at 0.1 second intervals. The EM system records in-phase and quadrature components and current waveform. Apparent resistivity is calculated from the in-phase and quadrature components of the current. 50,000 pseudogray half-space models. The data were interpolated onto a regular 50 m grid using a modified Akima (1978) technique. All grids were then resampled from the 50 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

NOTE: FL 1026 A new method of interpretation and analysis of Circulation, McGraw-Hill, v. 17, p. 1, p. 330-332.

LOCATION INDEX FOR 1:43,360-SCALE MAPS

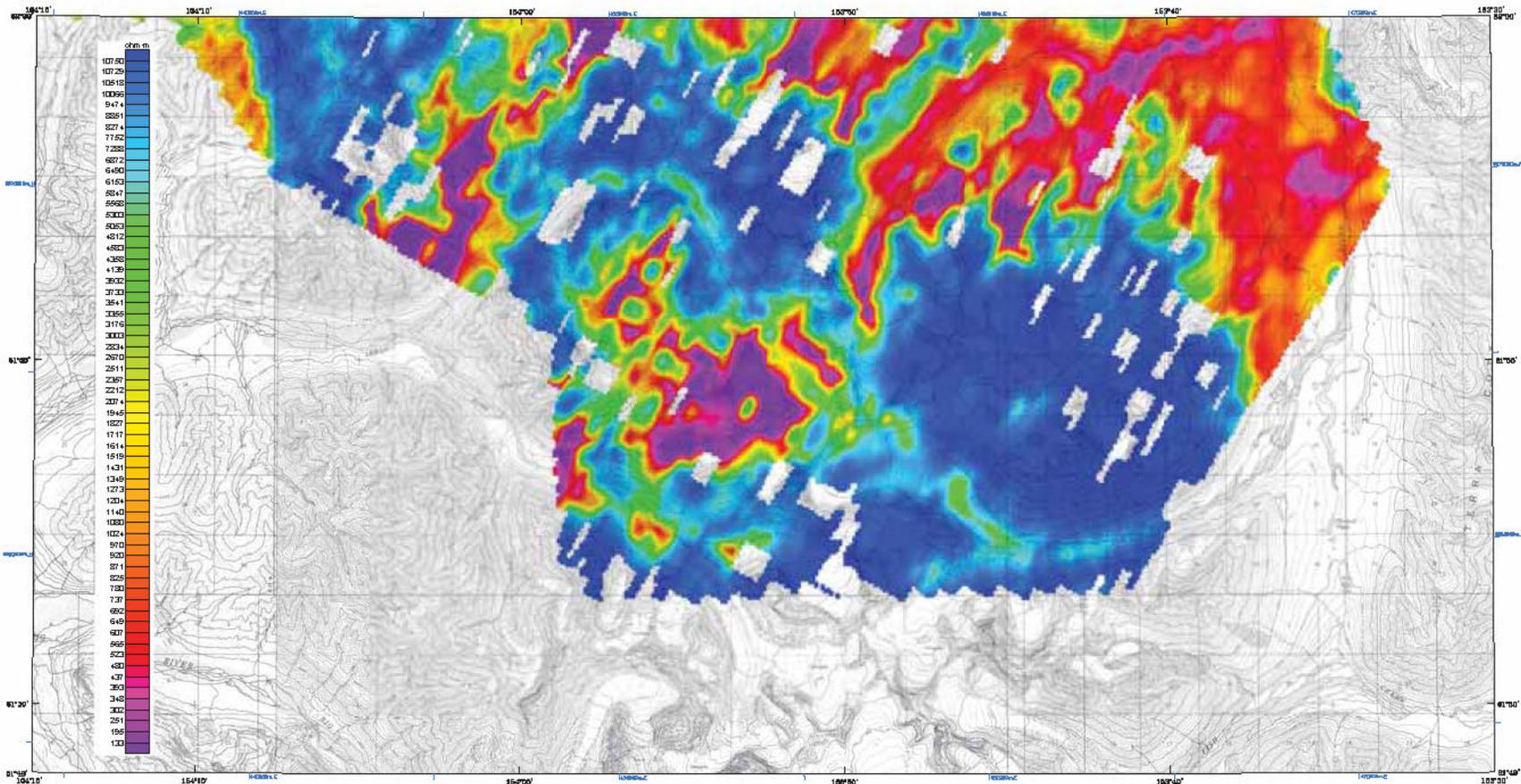


RESISTIVITY ALTITUDE LIMITS

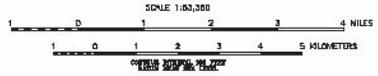
In areas where the EM bird height exceeded 100 m, resistivity was not calculated. The areas containing resistivity calculations due to small signals where the helicopter was higher to avoid terrain obstructions or low signal returns. Small areas in the grids were created where some of the high flying corrected over more than one survey line. Sparse grid values may be present after the resampling of the gridded data from the 50 meter cell size to the grid edge and are an artifact of the grid resampling. These values at edges of the grid lines due to being blank should be viewed with caution.

SURVEY HISTORY

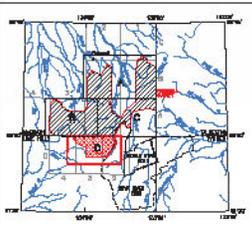
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Flujo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGG in 2013, 2013, and 2014. Flujo Geoservices, Inc. (Flujo) is a contractor to the current survey and is responsible for the location of the survey lines, survey routes, and data collection. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project. CGG (Flujo Geoservices, Inc.) (CGG) conducted the survey. Data from this survey are available in digital format in a central file through DGGGS, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.state.ak.us/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) format.



DATE: 2014-08-14; PROJECT: 2014-2-10D; AREA: 154°10' W - 154°15' W; 61°30' N - 61°45' N; SCALE: 1:63,360; DATUM: NAD83; UTM ZONE: 53N



LOCATION INDEX FOR 1:63,360-SCALE MAPS



7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium atomic error, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-820 spectrometer. The EM grid magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 53) spheroid, 1927 North American datum using a central meridian (CM) of 152.2, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DIGHEMY EM system measured in-phase and quadrature components of the frequency. Two vertical coplanar coil-pairs operated at 1000 and 5500 Hz with three horizontal coplanar coil-pairs separated at 500, 7200 and 58,000 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 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 20 m cell size to produce the maps and final grids contained in this publication.

Alaska, R. 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. 489-500.

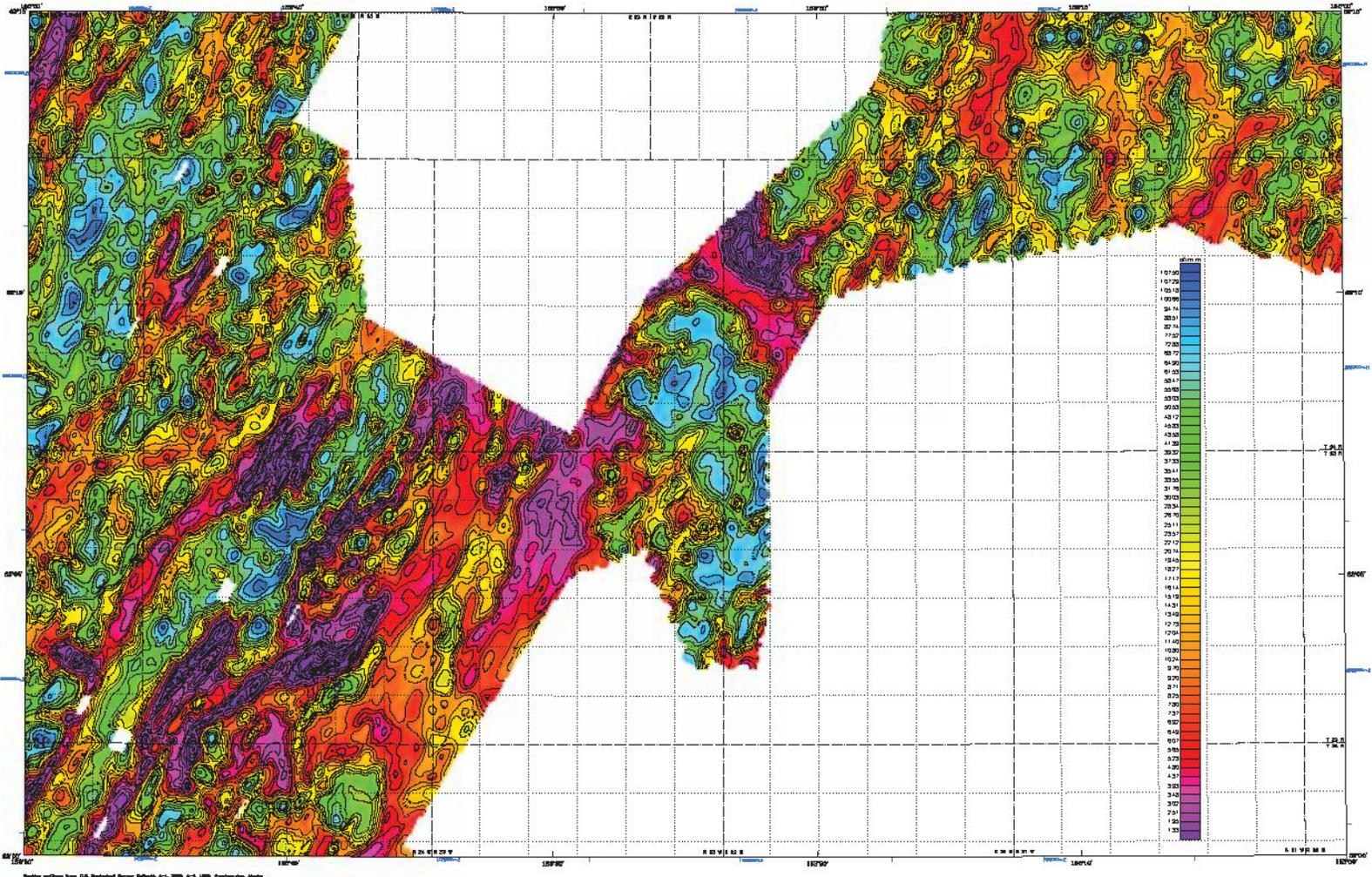
RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small areas 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. Sparse grid values may be evident after the resampling of the gridded data from the 80 meter to the 20 meter cell size at the grid edges and one on or off-top of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

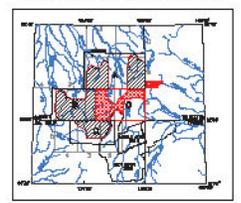
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Dillingham Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGG website (www.dggg.alaska.gov/pubs). Maps are also available on paper through the DGGG office, and are viewable online at the website in Adobe Acrobat PDF file format.



Source: Modified from U.S. Geological Survey Bulletin 14, 1986, p. 106, Geophysical Survey.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Larrel E. Burns, CGS, and Flugo Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOMAX Electromagnetics (EM) system, a Fugro D1344 magnetometer with a Fugro D2000 control system and a Rodion Solutions RB-200 ground-coupled magnetometer. The data were acquired as resistivity data with an Explorerium EM-832 spectrometer. The EM and magnetometer systems were flown at a height of 100 feet. The ground-coupled magnetometer was flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an AS-350-B3 helicopter. Helicopter altitudes were maintained at a mean terrain clearance of 200 feet along the EM-832 (107) 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 modified DEIMS-C2L Cloud Processing System was used for resistivity. The helicopter positions were obtained every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were obtained using the Global Positioning System (GPS) system. 1983 North American datum using a datum constant of 107.0 north-south, 0.0 east-west, and 0.0 datum constant of 100,000. Profile coordinates of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The GEOMAX EM system measured in-phase and quadrature components at the frequencies. The vertical coil-coupled magnetometer at 1000 and 6500 Hz while the horizontal coil-coupled magnetometer at 7200 and 24,000 Hz. EM data were acquired at 0.1 second intervals. The EM system measures in-phase, quadrature, and phase resistivity and derived resistivity. Apparent resistivity is calculated from the in-phase and quadrature components of the response. The data were processed using a regular grid with a modified Ahno (1970) technique. All grids were then resampled from the 60 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

NOTE: The 1000 Hz and 6500 Hz data were processed using the method of (Gardner, 1970, p. 10, p. 100-102).

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not collected. This article maps resistivity distributions due to wind speed where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where areas of high flying exceeded over more than one survey line. Sparse grid values may be present near the margins of the gridded data from the 80 meter to the 30 meter cell size at the grid edges and are a result of the grid resampling. These areas at edges of the grid lines due to flying height should be viewed with caution.

RESISTIVITY CONTOURS
1000
800
600
400
300
200
150
100
50

Contours in ohms at 10 intervals per decade
..... resistivity low

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Surveys (DGRS), and Flugo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by CGS in 2010, 2013, and 2014. Previously, Flugo Geoservices, Inc. collected and processed the current survey data shown in this location. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Department of Natural Resources and Geophysical Surveys Assessment Program. Cook Inlet Pipeline, Inc. (CIP) collected and processed the data for the area. All data and maps produced to date from DNR survey are available in digital format in DNO for a central file through DGRS, 2000 Chena Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGRS website (www.dgrs.state.ak.us/). These are also available on paper through the DGRS office, and are available online at the website in Alaska Aerial, PDF file format.

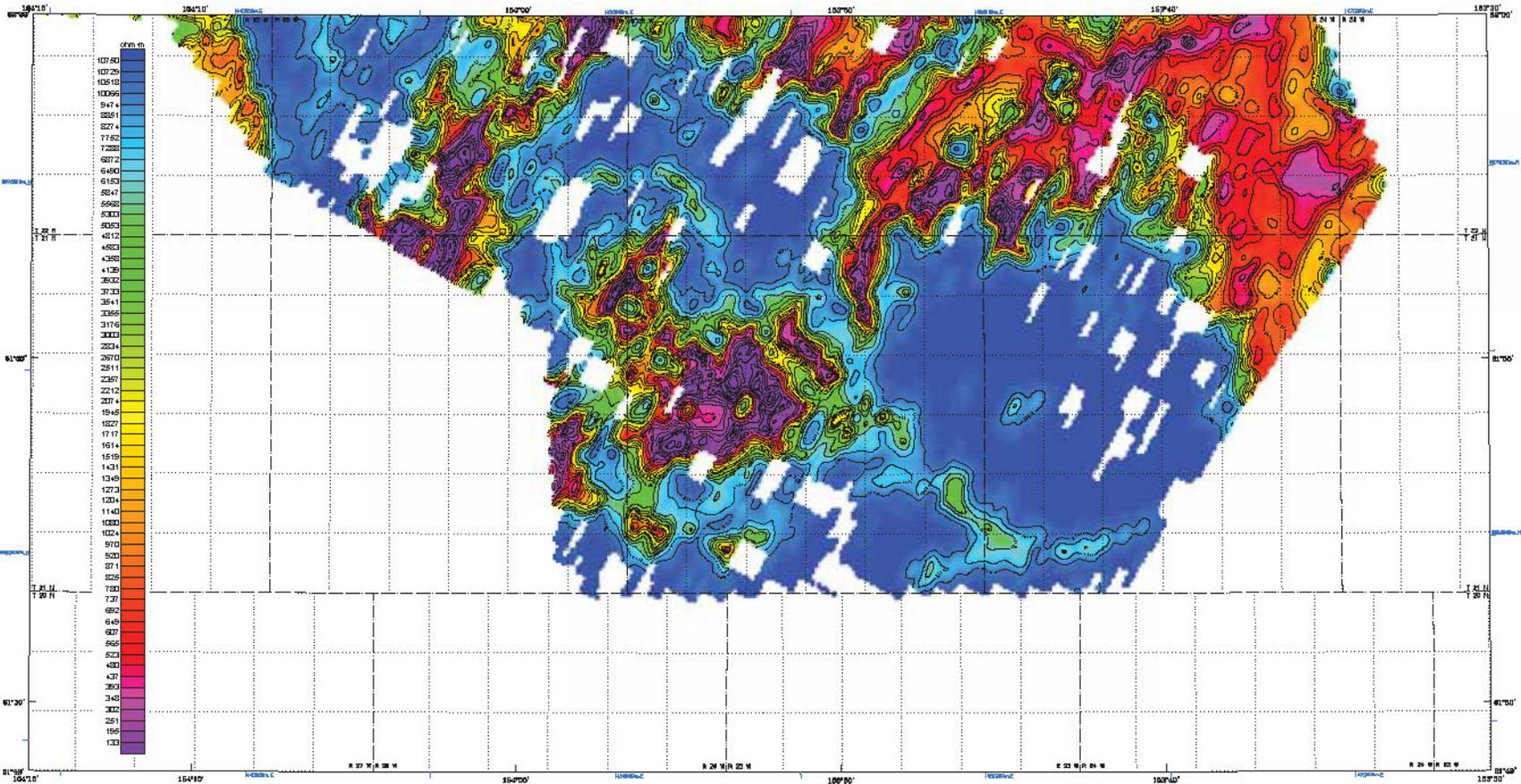
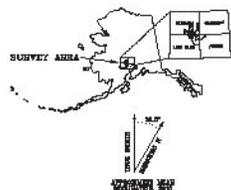


FIGURE 1. 7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA. UTM ZONE 53, DATUM NAD 83, SCALE 1:50,000.



7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Spintec CS3 cesium atomic sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploration GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 100-m (1200') 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected onto the Clarke 1886 (UTM zone 53) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

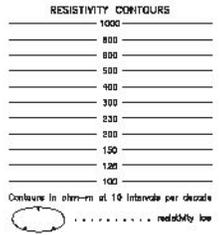
RESISTIVITY

The DIGHEMY EM system measured in-phase and quadrature components of the frequency. The vertical spatial cell-size operated at 1000 and 5500 Hz while three horizontal coplanar cell-pairs operated at 500, 7200 and 25,000 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 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 20 m cell size to produce the maps and final grids contained in this publication.

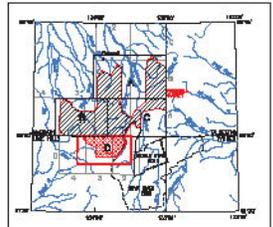
Alkms, R., 1970. A new method of interpolation and smooth curve fitting based on local polynomial curves of the Akima type. *Journal of Geophysical Research*, v. 75, no. 4, p. 406-408.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 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. Significant grid values may be present over the remaining of the gridded data from the 80 meter to the 20 meter cell size at the grid edges and one or an outlier at the grid remaining. These values at edges of the grid holes due to flying height should be viewed with caution.



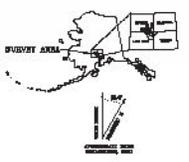
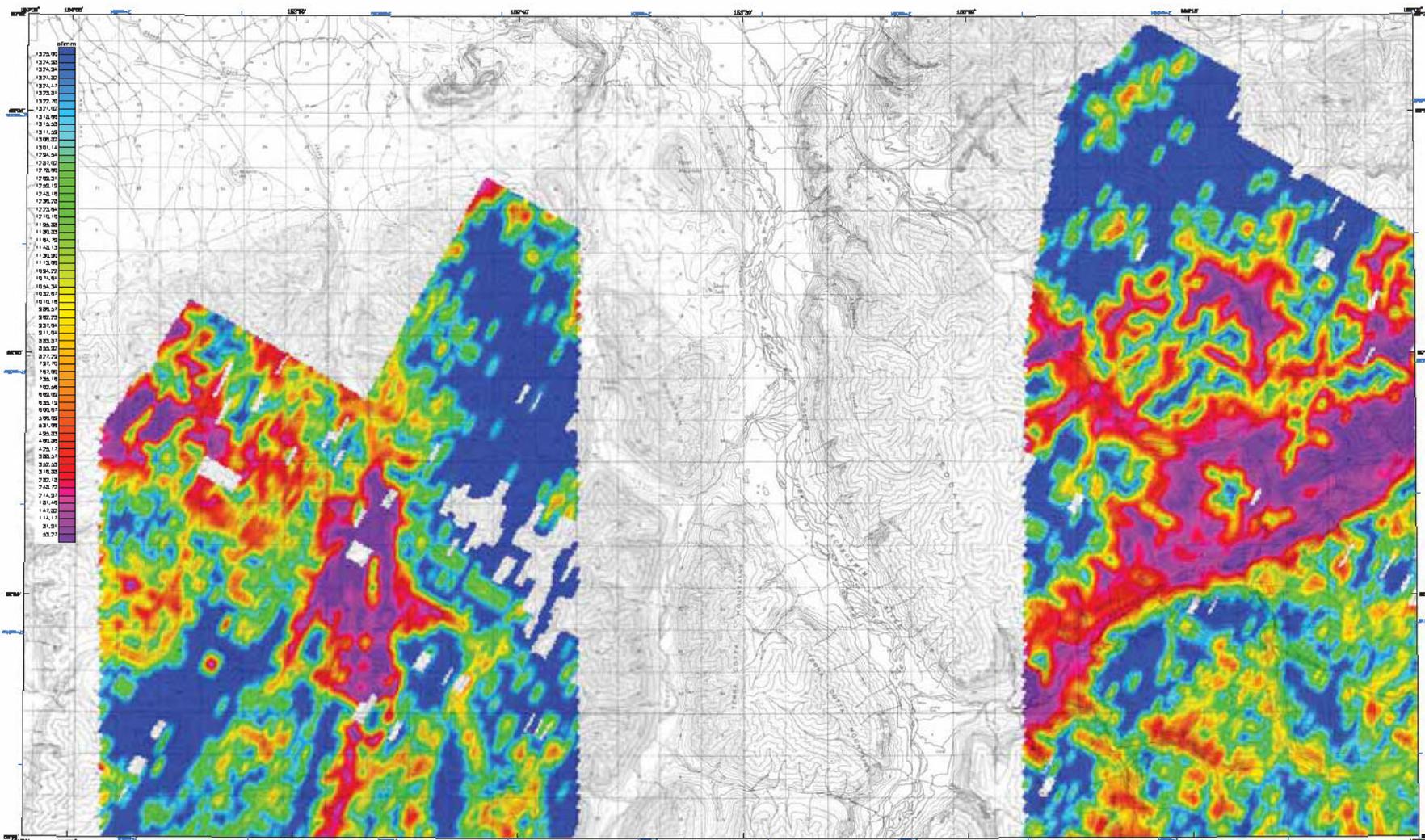
LOCATION INDEX FOR 1:63,500-SCALE MAPS



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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Dillingham 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.



DESCRIPTIVE NOTES

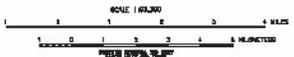
The geophysical data were acquired with a Geosoft Electromagnetic (EM) system, a Fugro OROSA magnetotelluric with a bottom 250 ocean sensor, and a Russian Belkora 05-200 ground-truth system. Some flights acquired the resistivity data with an Explorer-05-200 system. The EM and magnetotelluric were flown at a height of 100 feet. The geometry measurements were flown at a height of 200 feet. In addition to the survey (topographic) data, the Fugro OROSA data contained topographic elevation data for the mountains and some contour flights were performed on 40-200-030 flight lines. Contour at a single terrain elevation of 200 feet along 100-200 (100) survey lines with a spacing of a quarter of a mile. The data were then superimposed to the flight lines at intervals of approximately 2 miles.

A Russian Explorer-05-200 Magnetotelluric System was used for magnetotelluric. The magnetotelluric was flown every 2.5 minutes using a 100-foot differential capability to a relative accuracy of 0.1% (100:1) height. All data were then converted into the common base (UTM zone 50) elevation. 1000' height elevation datum using a digital elevation model of 100' or more dependent of it and on some contour of 200.000. Relative accuracy of the converted data is better than 10:1 with respect to the UTM grid.

RESISTIVITY

The DIGHEM EM system measured in-phase and quadrature components of the impedance. The in-phase data were averaged at 1000 and 5000 Hz after some horizontal averaging and noise removal at 500, 750 and 5000 Hz. The data were averaged at 0.1 second intervals. The raw resistivity is based on conductance, susceptance, inductance, and capacitive susceptance. Apparent resistivity is generated from the in-phase and quadrature components of the resistivity. The data were converted into a regular 60 m grid using a modified Akers (1972) technique. All grids were then converted from 60 m to 30 m and 15 m grids to be consistent with the 15 m grid used in this publication.

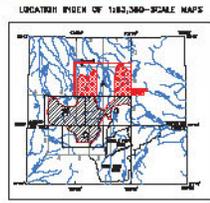
Figure 10, 1000 Hz, is a grid of in-phase and quadrature data. Figure 10, 5000 Hz, is a grid of in-phase and quadrature data.



900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014



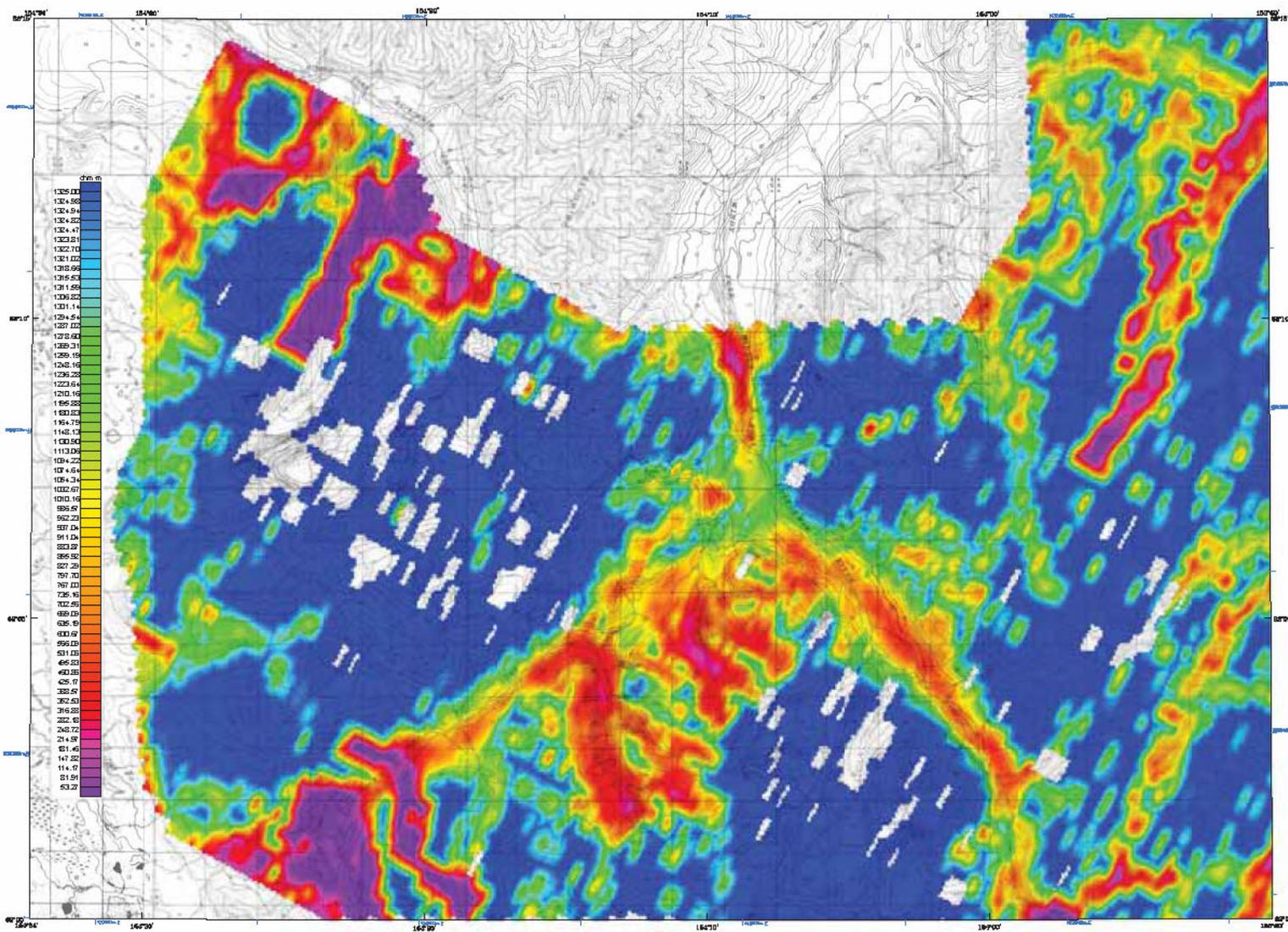
SURVEY HISTORY

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 Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. Fugro Geometrics DGGGS airborne geophysical data for the current survey are shown in the location map. The project was funded by the Alaska State Department of Natural Resources and DGGGS Alaska Assessment project, which is part of the Alaska Airborne Geophysical and Geophysical Inventory Program. Geosoft Inc. (GSI) contributed funding for a portion of the survey.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3300 Delaney Road, Fairbanks, Alaska, 99709-2000, and are distributed for free from the DGGGS website (www.dgggs.alaska.gov/usa). Maps are also available on paper through the DGGGS office and on flexible media of the maps in Adobe Acrobat PDF file format.

RESISTIVITY ALTITUDE LIMITS

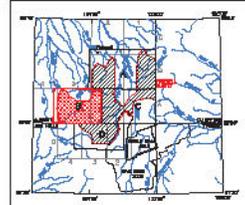
In areas where the grid line height exceeded 100 m, resistivity was not calculated. The resistivity measurements were calculated to a grid height where the topography was higher to avoid cultural objects or for safety reasons. Some data in the grid area covered where some of the topography was more than 100 m above the grid. Some data may be affected by the proximity of the ground data from the 10 m to the 25 m grid and the 25 m grid may not be as good as the 10 m grid. These values at edges of the grid have 20:1 error. 1000 Hz resistivity is shown with circles.



Base Data: U.S. Geological Survey Sheets A-4, 1838, A-4, 1839, 1840, A-4, 1841, Topographic Maps.

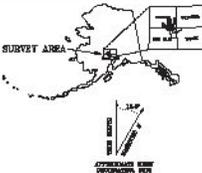


LOCATION INDEX FOR 1:63,360-SCALE MAPS



900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geosciences, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetics (EM) system, a Fugro D1 base magnetometer with a Scripps D30 control sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the resistivity data with an Earthstar EM-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 Super helicopter at a mean barolo clearance of 2500 feet along NW-SE (120°) 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 OEM-302 Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152° 0' north-south, and 0' east or west constant of 600,000. 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 coplanar coil-pairs spaced at 1000 and 5500 Hz with three horizontal coplanar coil-pairs operated at 900, 7500 and 58,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock, sediments, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the vector 58,000 Hz with the pseudo-layer half space model. The data were interpreted into a regular 80 m grid using a modified Alumbaugh (1973) 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.

ALUMBAUGH, R. (1973). A new method of interpretation and analysis using tilted sheets as sheet-parallel conductors at the intersection of conductivity boundaries. p. 117-124. In: Proc. 4th Int. Conf. on Geoelectromagnetics, 1973, p. 117-124.

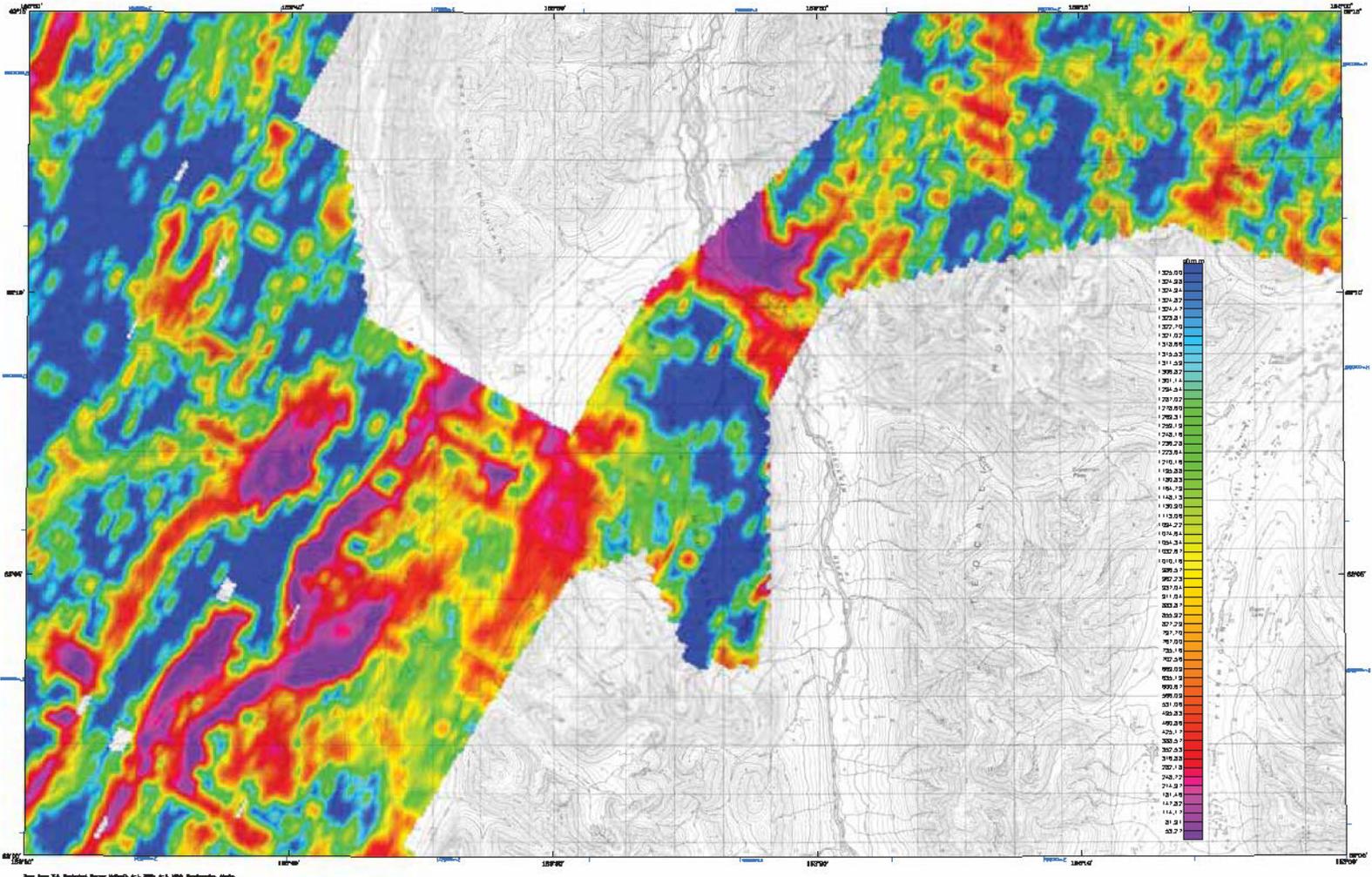
RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This occurs in areas where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where some of the high flying corrected over more than one survey line. Sparse grid values may be subject after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

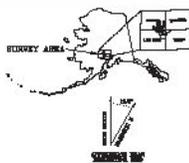
SURVEY HISTORY

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 Geosciences, Inc. Alaska geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Copyrighted Fugro DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat .PDF file format.



Scale from U.S. Geological Survey (Smith, et al., 1984, p. 4, 1984, Washington, Alaska)



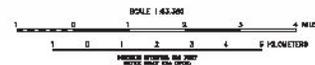
DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOMY Electromagnetics (EM) system, a Fugro D1244 magnetometer with a Fugro D3000 control system and a Rodascan Solutions RB-200 gamma-ray spectrometer. Some flight sections are referenced to data with an Explorerium EM-330 spectrometer. The EM and magnetometer sections were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters and video cameras. Flights were performed with an AS-350-B3 helicopter. Helicopter altitudes were measured with a Raytheon RB-200 altimeter with a reading of a quarter of a mile. The line was flown perpendicular to the flight lines at intervals of approximately 3 miles. A Fugro DEMS-C21 Check Pointing System was used for navigation. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were obtained using the Corvus 1550 (TM) core G1 uplink, 1527 North American datum using a ground vector (G1) of 137.0 north-south of 0 and an east constant of 268,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The GEOMY EM system measured in-phase and quadrature components at the transmitter. The vertical double-dipole oriented at 1000 and 5000 Hz while the horizontal double-dipole oriented at 800, 7500 and 96,000 Hz. EM data were acquired at 0.1 second intervals. The EM system records in-track, cross-track, in-phase, quadrature, and total magnetic moment. Apparent resistivity is calculated from the in-phase and quadrature components of the system. A 5000 Hz pseudo-layer half-space model. The data were interpolated onto a regular 50 m grid using a nearest-neighbor technique. All grids were then resampled from the 50 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

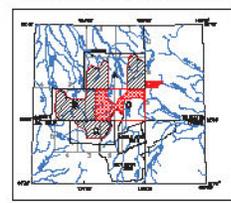
NOTE: The 1928 A sea level of 1984 and 1985 are shown. Source: Alaska Department of Geological and Geophysical Surveys, v. 17, p. 4, 1984-1985.



900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Lance E. Burns, CGG, and Fugro Geoservices, Inc.
2014

LOCATION INDEX FOR 1:43,200-SCALE MAPS

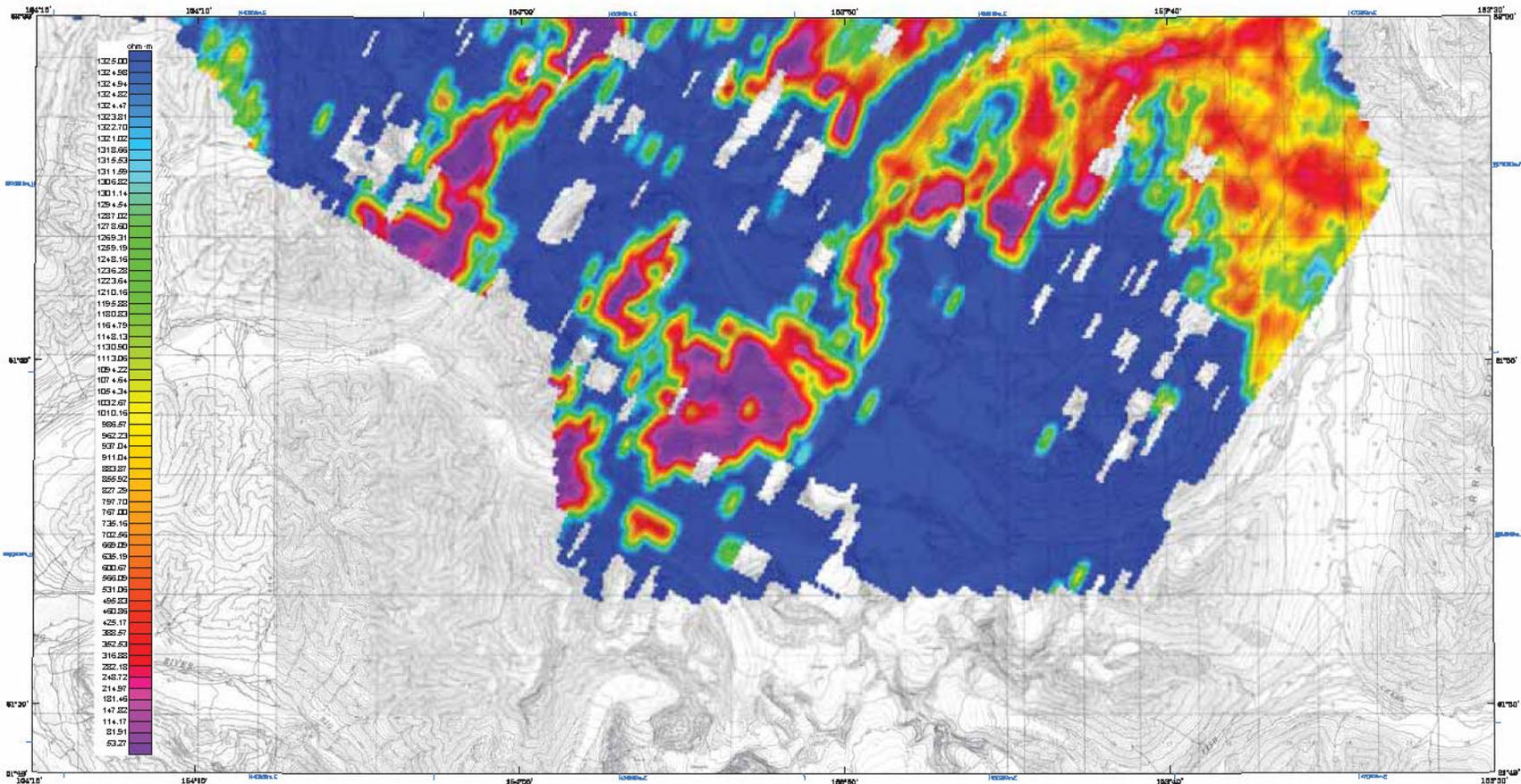


RESISTIVITY ALTITUDE LIMITS

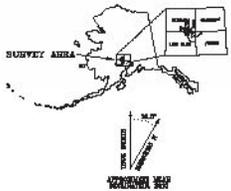
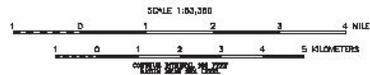
In areas where the EM bird height exceeded 150 m, resistivity was not calculated. The areas showing low resistivity indications due to small signals where the helicopter was higher to avoid terrain obstructions or low survey line. Small areas in the grids were created where some of the high flying corrected over more than one survey line. Sparse grid values may be present after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid lines due to being blank should be viewed with caution.

SURVEY HISTORY

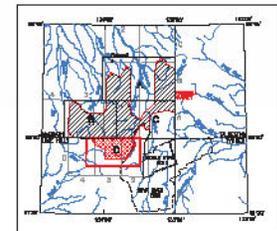
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. (Fugro). Original data for the area were collected and processed by CGG in 2013, 2013, and 2014. Fugro Geoservices, Inc. (Fugro) was contracted to process the current survey data shown in this location index by David Fisher, survey manager, and John P. Johnson. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project, which is part of the Alaska State Department of Natural Resources and Geophysical Surveys Assessment project. Data from this survey are available in digital format on DVD for a central file through CGG, 2200 College Blvd., Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.state.ak.us/). Maps are also available on paper through the DGGGS office, and geospatial data of the maps is available in ArcView, PDF, or other formats.



DATE: 2014-08-14; PROJECT: 2014-2-12D; AREA: 154°10' W - 154°15' W, 61°30' N - 61°45' N; SCALE: 1:63,560; CONTIGUOUS SHEET:



LOCATION INDEX FOR 1:63,560-SCALE MAPS



900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium atomic clock, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explanium GR-820 spectrometer. The EM grid magnetic bearings were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the processed data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DIGHEMY EM system measured in-phase and quadrature components of low frequencies. Two vertical coplanar coil-pairs operated at 1000 and 3500 Hz with three horizontal coplanar coil-pairs separated at 500, 7500 and 58,000 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 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.

Alkms, R., 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. 489-500.

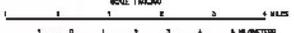
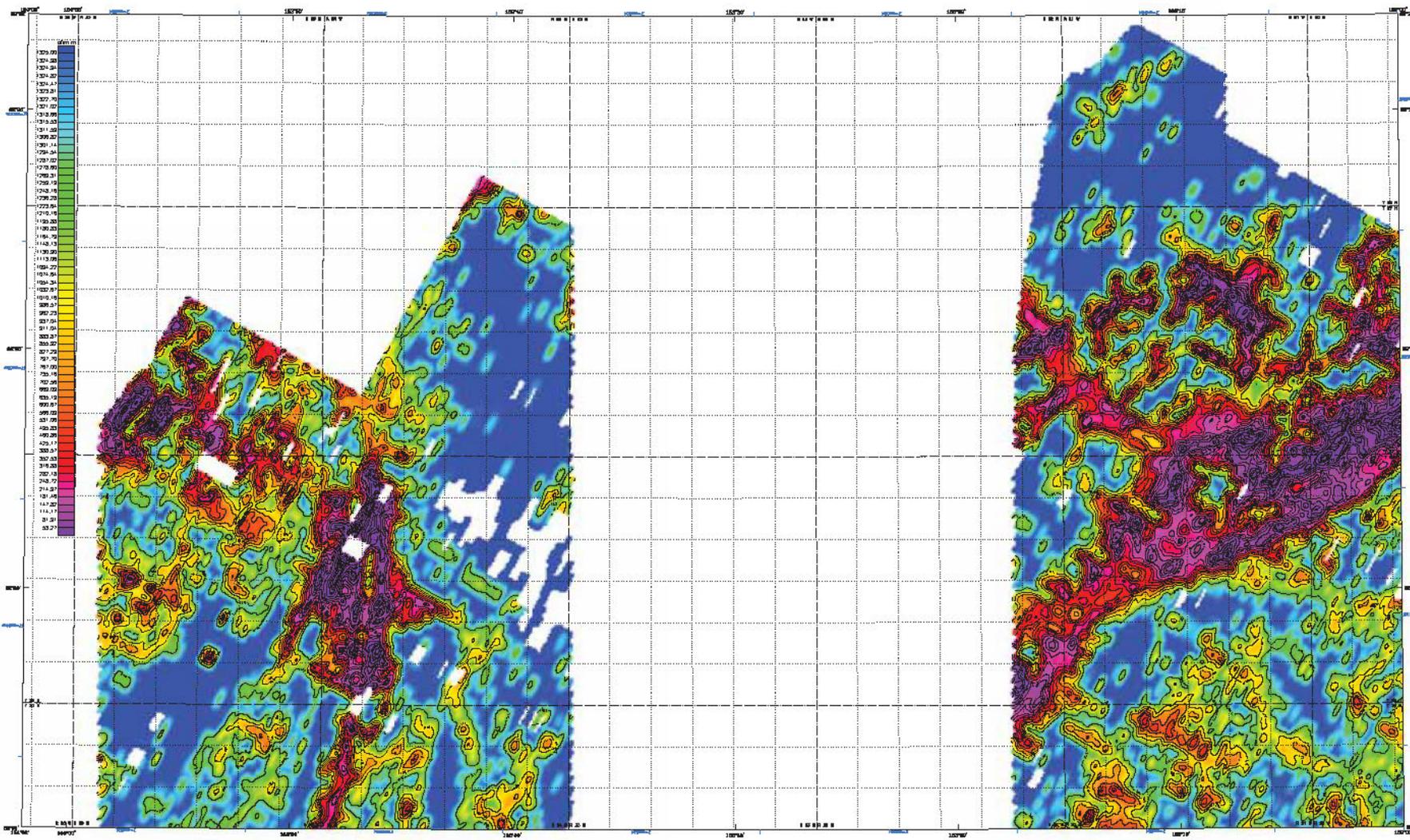
RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small angles 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. Sparse grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and one on or off of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

SURVEY HISTORY

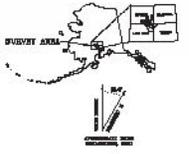
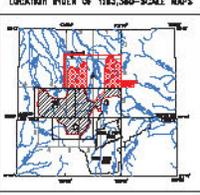
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3304 Collins Road, Fairbanks, Alaska, 99703-3707, 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.



900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, SWEWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES
by
Lauri E. Duran, CGA and Fugro Geoscience, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro D300 magnetotelluric with a modified 200 meter sensor, and a Fugro D300 system receiver system. Some flights acquired the resistivity data with an Explorer-60-200 system. The EM and magnetic sensors were flown at a height of 100 feet. The geometry measurements were taken at a height of 200 feet. In addition to the resistivity data, the system also collected magnetic data. The data were collected at a magnetic declination of 250 degrees (1982) and a magnetic anomaly of 100 units. The data were collected at a magnetic declination of 250 degrees (1982) and a magnetic anomaly of 100 units. The data were collected at a magnetic declination of 250 degrees (1982) and a magnetic anomaly of 100 units.

RESISTIVITY

The DISIR™ EM system measured in-phase and quadrature components of the magnetic field. The resistivity data were derived from the in-phase component of the magnetic field. The resistivity data were derived from the in-phase component of the magnetic field. The resistivity data were derived from the in-phase component of the magnetic field.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM field height exceeded 100 m, resistivity was not calculated. The resistivity was not calculated in areas where the EM field height exceeded 100 m. The resistivity was not calculated in areas where the EM field height exceeded 100 m.



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 Geoscience, Inc. Airborne geophysical data for the area were acquired and processed by DGGS in 2012, 2013, and 2014. The current survey was flown by the Alaska State Geophysical Survey in 2014. The data were collected at a magnetic declination of 250 degrees (1982) and a magnetic anomaly of 100 units. The data were collected at a magnetic declination of 250 degrees (1982) and a magnetic anomaly of 100 units.

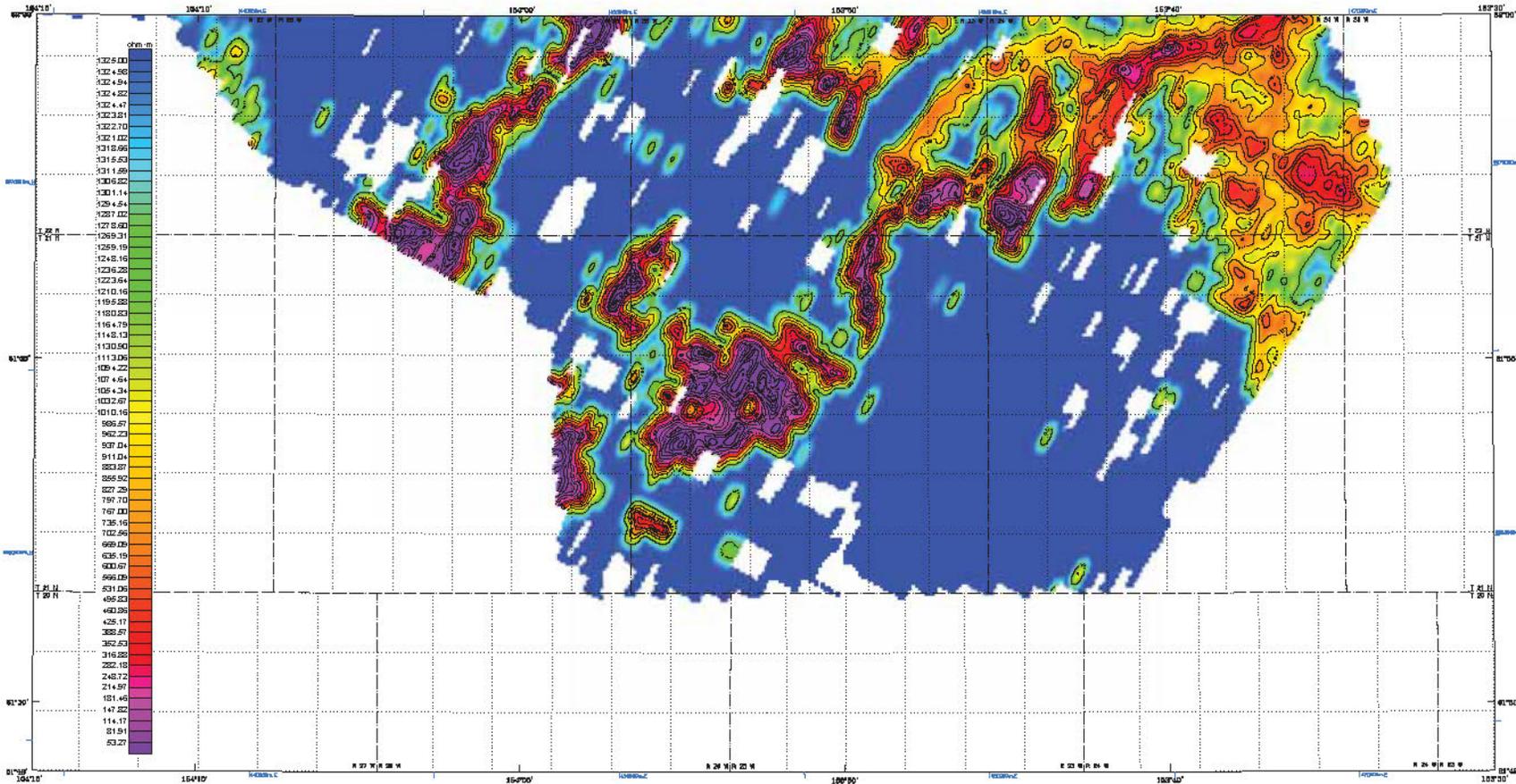


FIGURE 1. 900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA.



900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

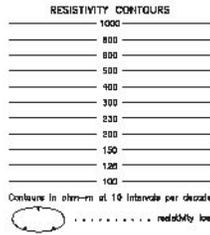
The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploration GR-820 spectrometer. The EM grid magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 1000 x 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight conditions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the processed data is better than 10 m with respect to the UTM grid.

RESISTIVITY
The DIGHEMY EM system measured in-phase and quadrature components of the frequency. The vertical spatial cell-size operated at 1000 and 5500 Hz with three horizontal coplanar cell-pairs operated at 900, 7200 and 25,000 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 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 20 m cell size to produce the maps and final grids contained in this publication.

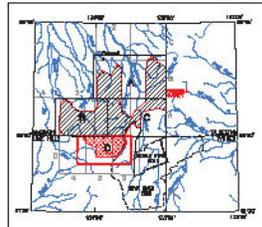
Alaska, R. 1976. A new method of interpolation and smooth curve fitting based on local polynomial splines of the Association of Computing Machinery, v. 12, no. 4, p. 486-490.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This profile resistivity calculation is due to aerial 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. Significant values may be present over the remaining of the gridded data from the 80 meter to the 20 meter cell size at the grid edges and on an orobit at the grid northing. These values at edges of the grid lines due to flying height should be viewed with caution.

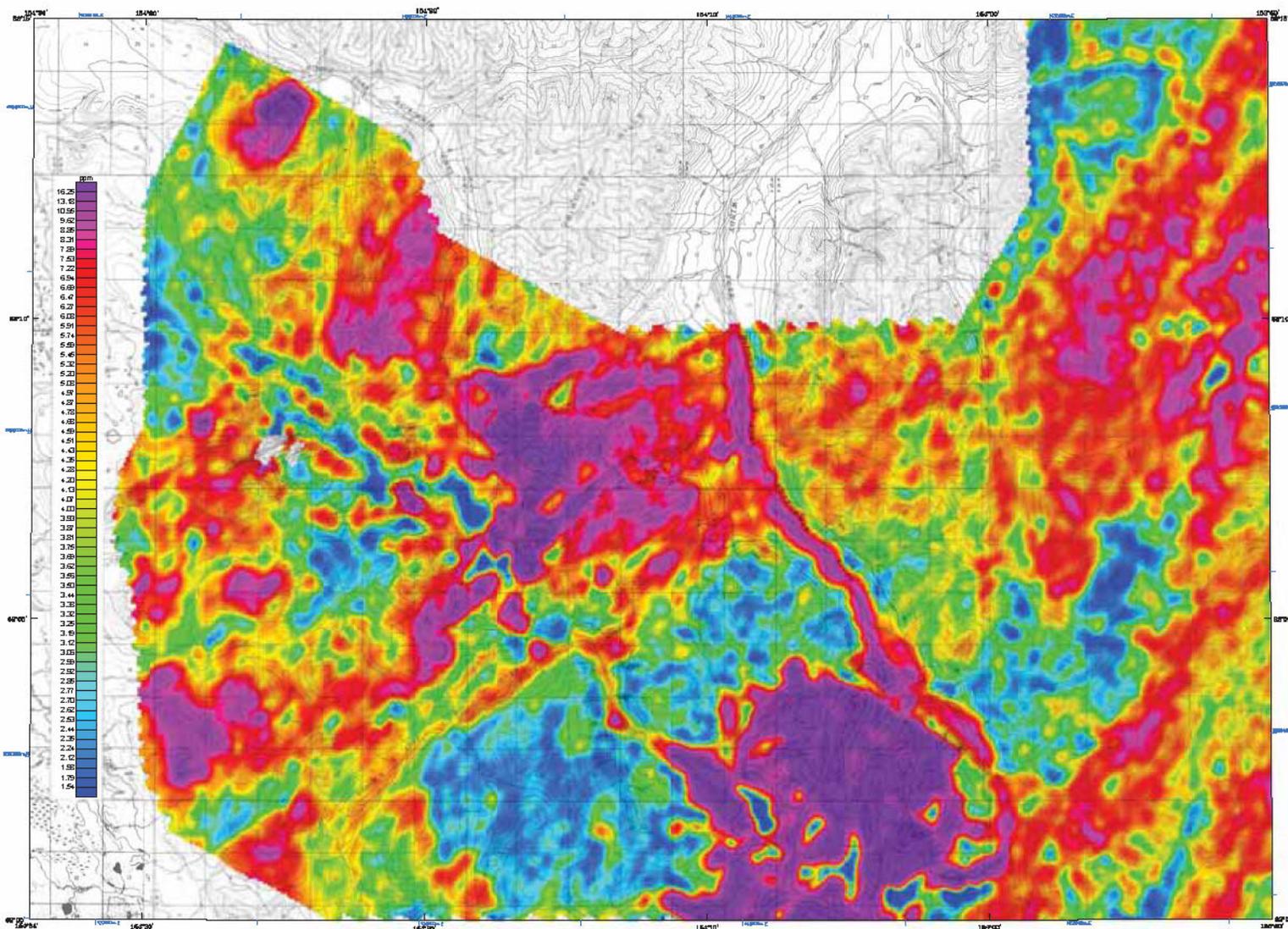


LOCATION INDEX FOR 1:63,360-SCALE MAPS

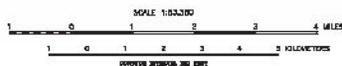
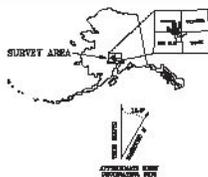


SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3364 Dillingham 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 effort, and are viewable online at the website in Adobe Acrobat PDF file format.



See Item 218, Radiometric Survey Methods, A-4, 1998, A-4, 1999, and A-4, 1994, for more details.



THORIUM (eTh) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

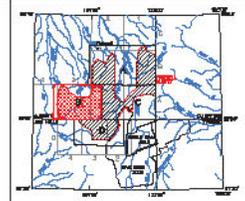
by
Laural E. Burns, CGG, and Fugro Geoservices, Inc.
2014

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-300 spectrometer was the primary instrument used, however an Egamonium 40-820 spectrometer was used for some flights. Both were configured with 18.81 (1026 cubic inches) of high-purity NaI crystal detector, and 4.31 (256 cubic inches) of upward looking (rod) detector. After application of Pulse-Shape Discrimination to the spectra, counts from the main detector were recorded in the windows corresponding to thorium (2410-2810 keV), uranium (1460-1860 keV), potassium (1470-1670 keV), total radioactivity (400-2818 keV) and cosmic radiation (3000-3400 keV). Counts from the rod detector were recorded in the rod window (1180-1460 keV). The rod detector system was calibrated following methods outlined in NEA Report 303. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and distance from the ground survey elevation of 300 feet. The data were then converted to atomic concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 20 m cell size to produce the maps and first grids contained in this publication.

International Atomic Energy Agency, 1991, *Reference Methods for Radiometric Surveying*, Technical Report 225, Vienna: International Atomic Energy Agency, Vienna.

LOCATION INDEX FOR 1:63,360-SCALE MAPS

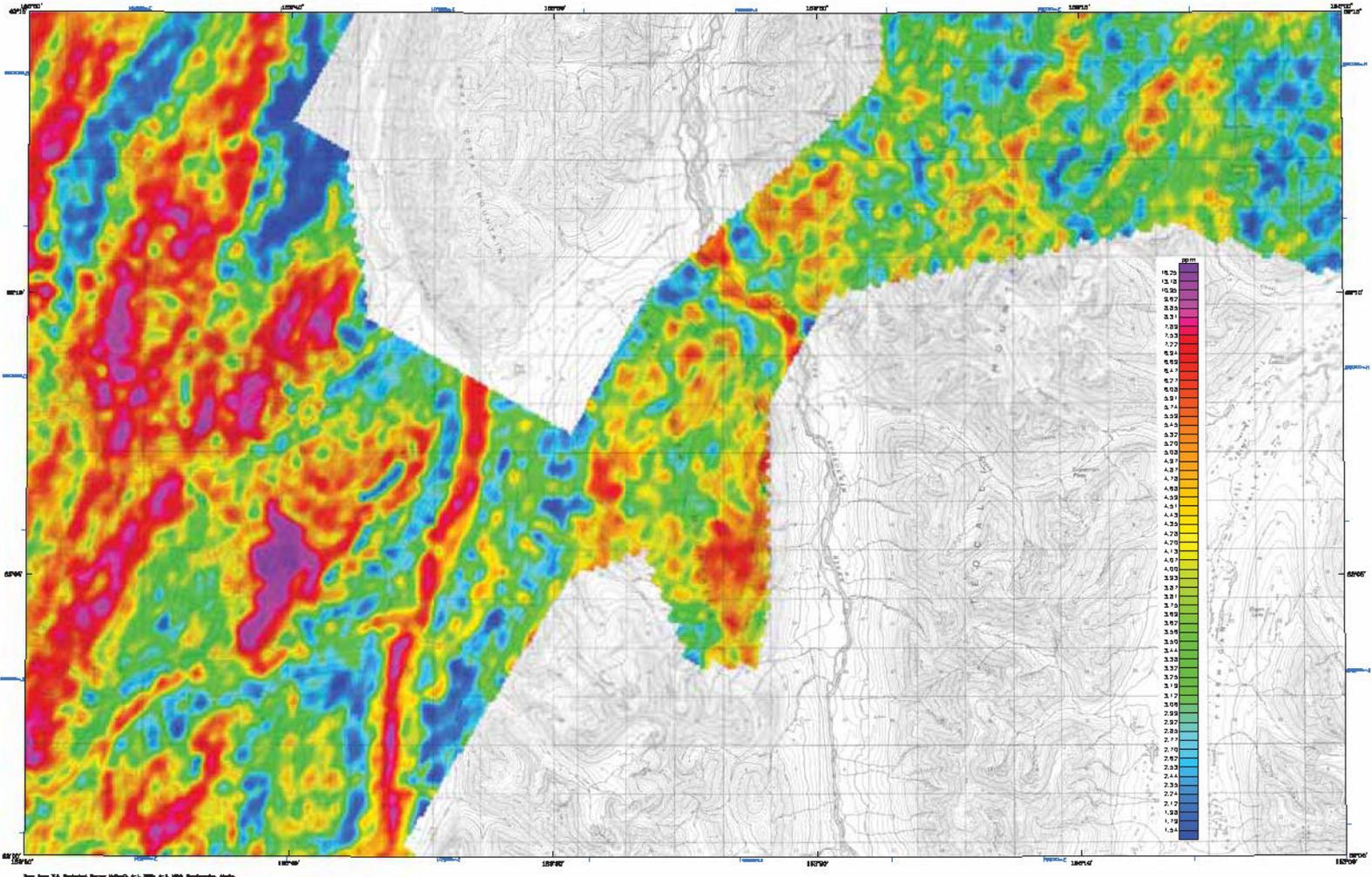


SURVEY HISTORY

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 former geophysical data for the area were acquired and processed by CGG in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Division of Geological & Geophysical Surveys Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. 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 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DGGGS Electronics (EVI) system, a Fugro D1300 magnetometer with a Scripps 300 cesium sensor, and a Radiation Solutions RS-300 spectrometer. Some flights acquired the radiometric data with an Egamonium 40-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an A300-82 Stratix helicopter of a mean terrain clearance of 2500 feet along NW-SE (120°) 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 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 152°, a north coordinate of 0 and a scale constant of 0.999993. Precision accuracy of the presented data is better than 10 m with respect to the UTM grid.



Scale: 1:43,360



THORIUM (eTh) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

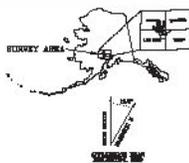
PARTS OF MCGRATH AND LINE HILLS QUADRANGLES

by
Loren E. Burns, CGS, and Fugro Geoservices, Inc.
2014

RADIOMETRICS

The gamma-ray spectrometry data were collected at a 1.0 second sample rate. A Radiation Solutions RS-200 gamma-ray spectrometer was the primary instrument used, however an Explorer RS-200 spectrometer was used for some flights. Both were configured with 15.4% (1025 mm) NaI(Tl) crystals (40% efficiency) for gamma-ray detection. After acquisition of these adjusted digital data, corrections for the spectral counts from the rock detector were recorded in the software corresponding to the detector (1015-1017 keV), uranium (1120-1160 keV), potassium (1460-1470 keV), total radioactivity (1500-2015 keV) and thorium (2080-2600 keV) counts from the rock detector were recorded in the data stream (1160-1160 keV). The rock detector system was calibrated following methods outlined in USGS Report 2011. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 500 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. An area was then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final data contained in this publication.

©2014 Alaska Division of Geological & Geophysical Surveys, Technical Report 2014-2-22C, prepared for the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys.

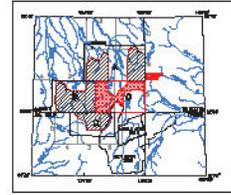


DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSPEC Electromagnetics (EM) system, a Fugro D1244 magnetometer with a Bartington 030 fluxgate sensor and a Radiation Solutions RS-200 gamma-ray spectrometer. Some flight tracks are indicated on the map with an Explorer RS-200 spectrometer. The EM and magnetometer sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry and video cameras. Flights were performed with an RS-200-83 (8000 ft) aircraft with a mean terrain clearance of 200 feet during IM-82 (1000 ft) survey flight times 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 Hatched DEMS-C2L Cloud Positioning System was used for navigation. The helicopter position was observed every 6-7 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the CORS (1000 north zone 6) reference, 1927 North American datum using a corrected vector (CM) of 103.7 north component of 0 and an east constant of 268,000. Positioning accuracy of the presented data is better than 10 m with respect to the UTM grid.

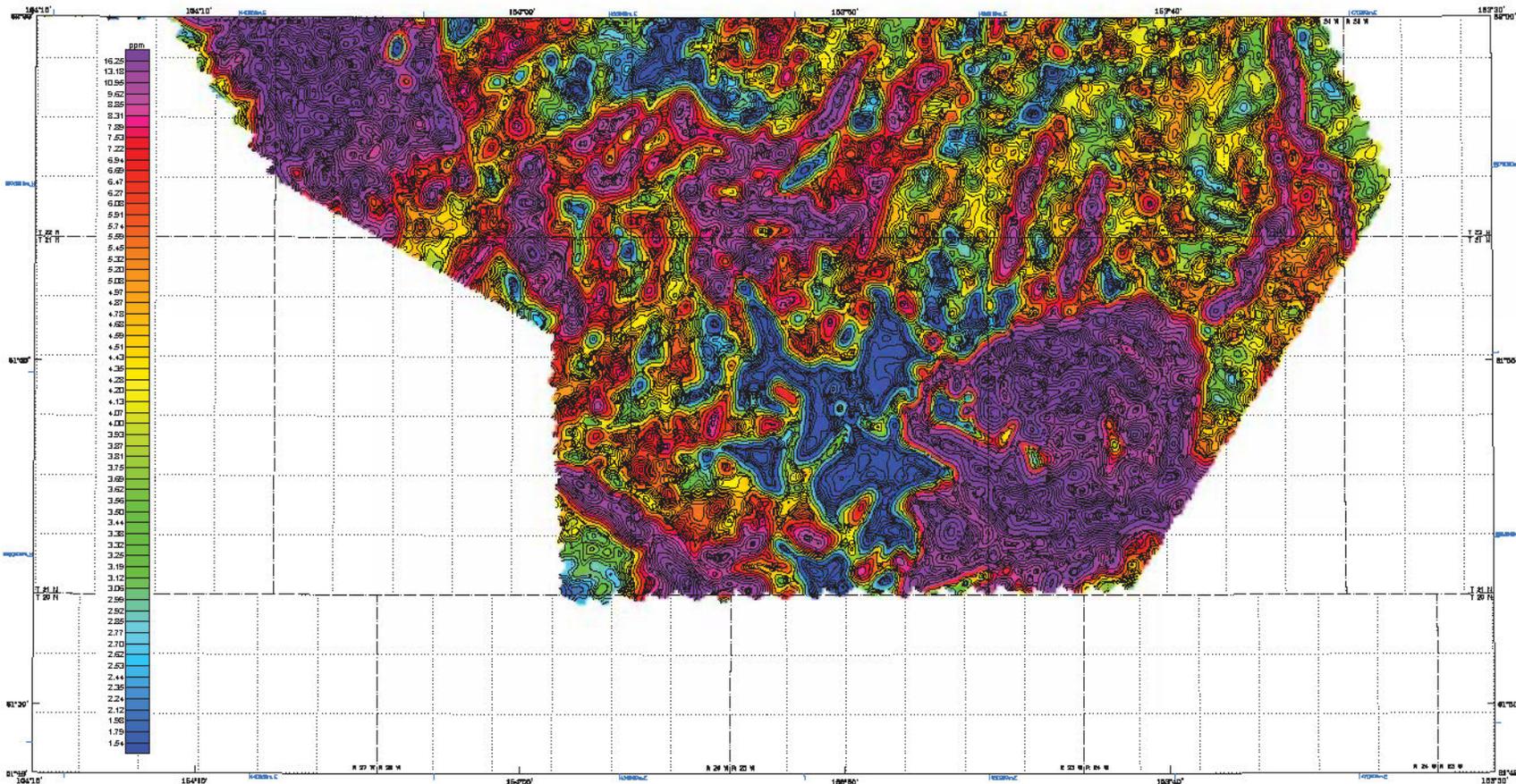


LOCATION INDEX FOR 1:43,360-SCALE MAPS

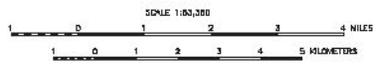


SURVEY HISTORY

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 CGS in 2013, 2013, and 2014. Previously, many DGGGS surveys conducted to the current survey are shown in the location map by shaded lines, survey routes, and date of publication. The project was funded by the Alaska State Department of Natural Resources as part of the Alaska State Lands Assessment project, which is part of the Alaska State Lands Assessment and Geophysical Inventory Program. Cook Inlet Region, Inc. (CIRI) conducted land use for a portion of the area. All data and maps produced to date from DGN survey are available in digital format in DNO for a central file through DGGGS, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.state.ak.us/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.



Survey Area: 1:63,360 Scale. UTM Zone 53 N. Datum: NAD 83. Contour Interval: 0.25 ppm.



THORIUM (eTh) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters. GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an RS-350/83 Squirrel tail-copter at a mean terrain clearance of 200 feet along 1,200' 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.

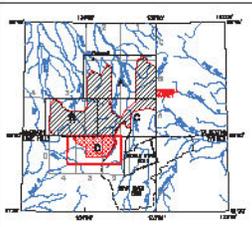
A Novatel OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight conditions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of NaI Adjusted Single Voxel Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (2000->8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size data to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1981. *Alphabetic Surveying Method*. Technical Report 323. International Atomic Energy Agency, Vienna.

LOCATION INDEX FOR 1:63,360-SCALE MAPS



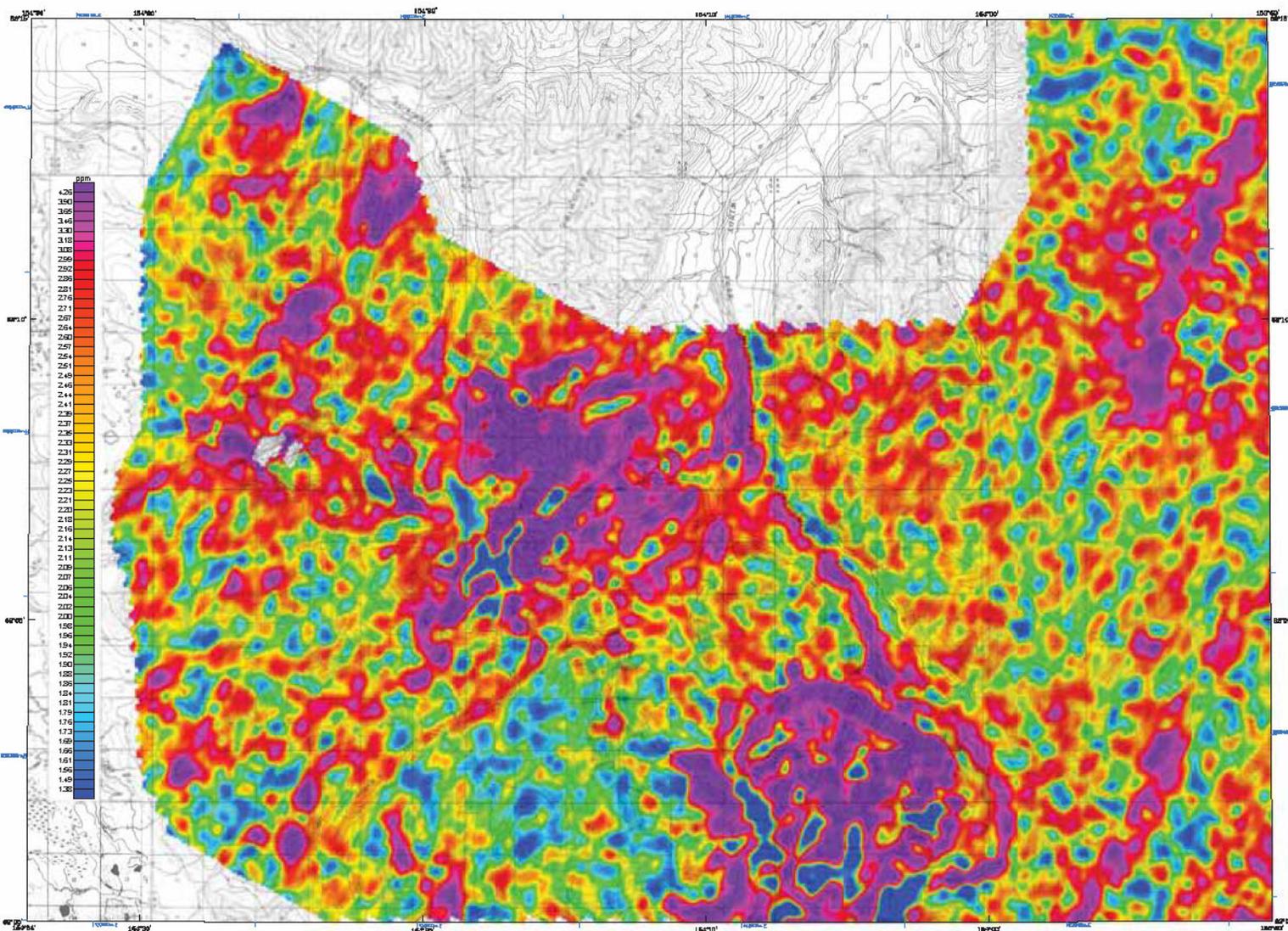
CONTOUR INTERVAL

.....	0.00 ppm
.....	1.00 ppm
.....	0.25 ppm

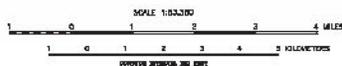
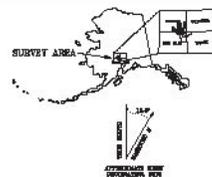
SURVEY HISTORY

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3304 Collins 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 effort, and are viewable online at the website in Adobe Acrobat PDF file format.



See Item 218, Radiometric Survey Methods, A-1, 1998, A-3, 1999, Methods A-1, 1994, Spectrometry, 218a.



**URANIUM (eU)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laural E. Burns, CGG, and Fugro Geosciences, Inc.
2014

RADIOMETRICS

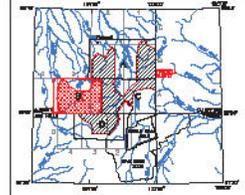
The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-700 gamma-ray spectrometer was the primary instrument used, however an Egamonium 40-820 spectrometer was used for some flights. Both were configured with 18.8L (1226 cubic inches) of high-purity NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (rod) detector. After application of pulse-shape discrimination to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1460-1860 keV), potassium (4770-5770 keV), total radioactivity (400-2818 keV) and cosmic radiation (3000-4000 keV). Counts from the rod detector were recorded in the rod window (1180-1860 keV). The rod detector system was calibrated following methods outlined in NEA Report 302. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and distance from the ground survey elevation of 300 feet. The data were then converted to atomic concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then reprojected from the 100 m cell size datum to a 20 m cell size to produce the maps and first grids contained in this publication.

International Atomic Energy Agency, 1991, *Reference Methods for Radiochemical Neutron Activation Analysis*, International Atomic Energy Agency, Vienna.

DESCRIPTIVE NOTES

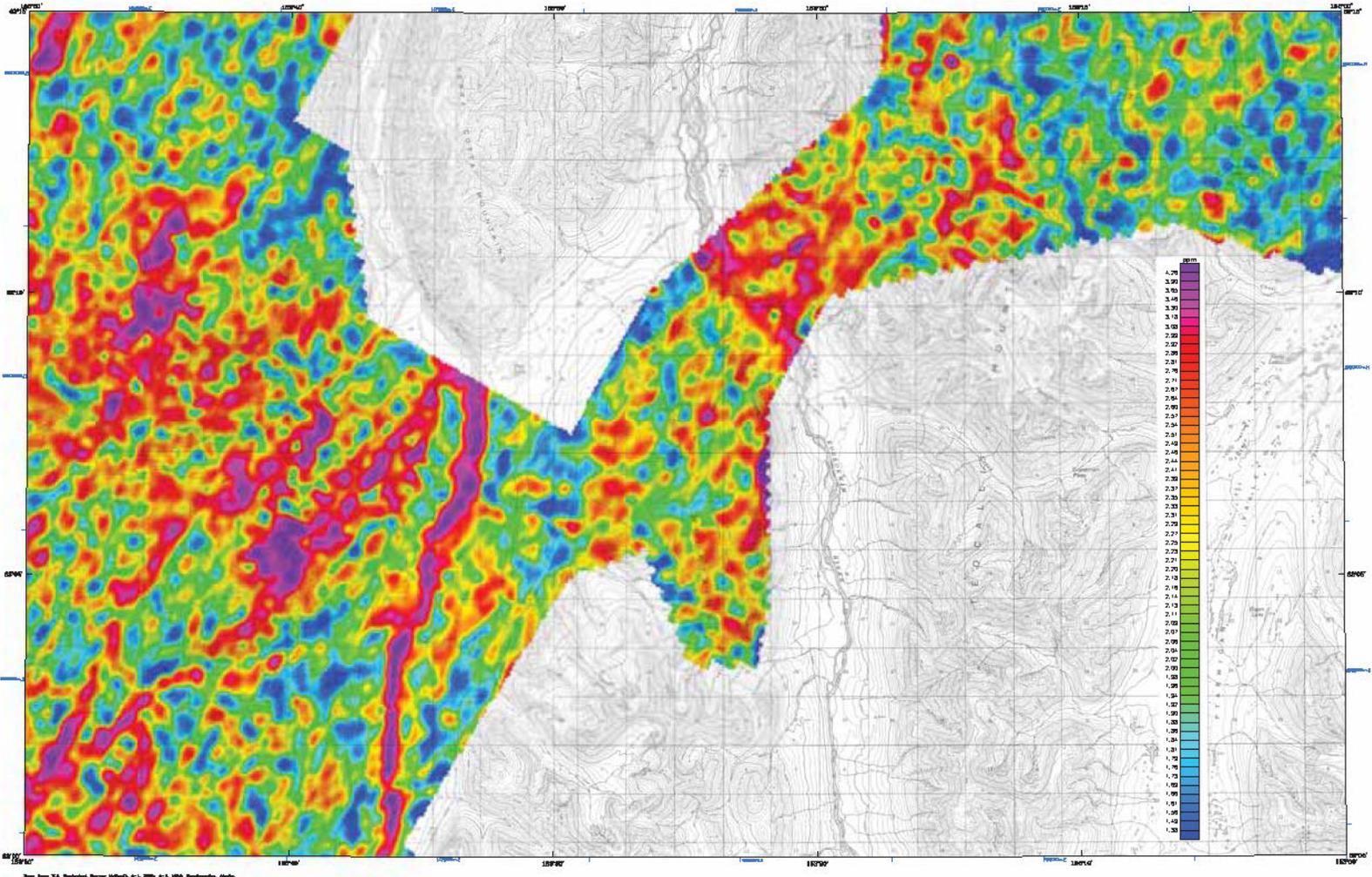
The geophysical data were acquired with a DORAD® Electromagnetic (EM) system, a Fugro D1-300 magnetometer with a Scripps 300 cesium sensor, and a Radiation Solutions RS-700 gamma-ray spectrometer. Some flights acquired the radiometric data with an Egamonium 40-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from rod and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 Super helicopter of a mean terrain clearance of 2500 feet along NW-SE (120°) 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 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152° 0' north coordinate, 0' and a east constant of 600,000. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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 Geosciences, Inc. All former geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Data were flown from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Division of Geological & Geophysical Surveys Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.

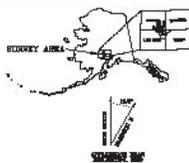


**URANIUM (eU)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**

by
Larry E. Burns, CGG, and Flagra Geoservices, Inc.
2014

RADIOMETRICS

The gamma-ray spectrometry data were collected at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorer RS-200 spectrometer was used for some flights. Both were configured with 15.4% (1026 net% total) of both (Geant4) and (Geant4) detectors, and 400 (204 net% total) of upward looking (Geant4) detectors. After acquisition of Net Adjusted Single Data (NADSD) to the ground station from the main detector were recorded in the database corresponding to location (1915-1917 km), elevation (1300-1300 m), population (1700-1700 km), total population (500-2015 km) and density (2000-5000 km), counts from the main detector were recorded in the data base (1915-1917 km). The radiometric system was calibrated following methods outlined in US Report 321. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 500 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. An error was then propagated from the 100 m cell size down to a 25 m cell size to produce the maps and final data contained in this publication.

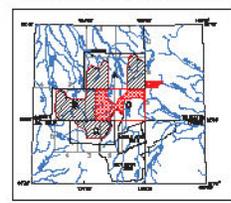


DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSKY Electromagnetics (EM) system, a Fugro D1244 magnetometer with a Fugro D2000 control system and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights collected the radiometric data with an Explorer RS-200 spectrometer. The EM and radiometric surveys were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 30-foot barometers and video cameras. Flights were performed with an RS-500-53 (500-foot) barometer at a mean terrain clearance of 200 feet during 100-500 (100-foot) survey flight time with a maximum of a quarter of a mile. The line was flown perpendicular to the flight lines at intervals of approximately 3 miles.

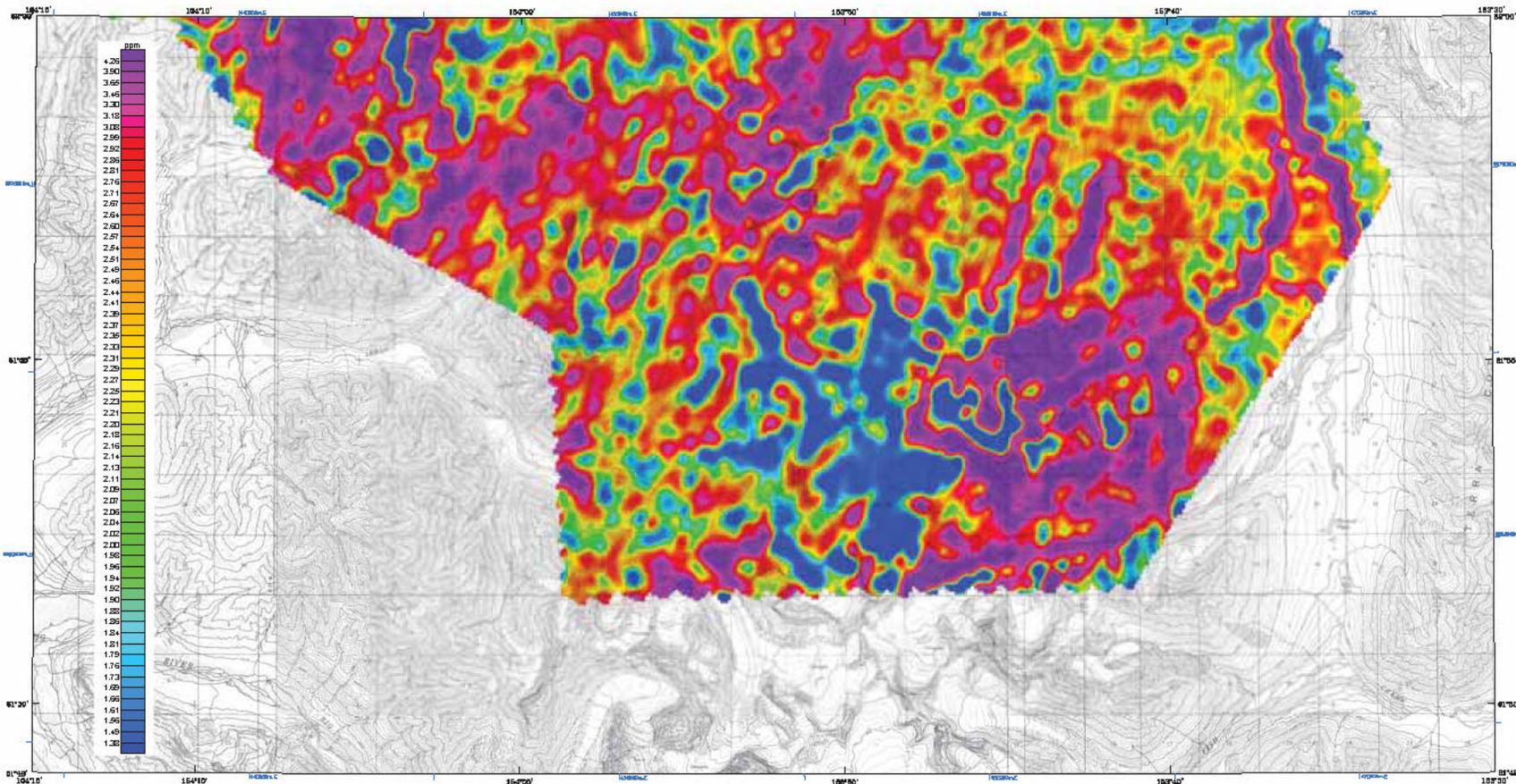
A Fugro D244-521, Global Positioning System was used for navigation. The helicopter position was observed every 6-5 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data positions were collected using the Fugro D1244 (100-foot) barometer, 100-foot barometer datum using a standard vector (CV) of 100.0 north constant of 0 and an east constant of 000.000. Position accuracy of the presented data is better than 10 m with respect to the UTM grid.

LOCATION INDEX FOR 1:63,360-SCALE MAPS

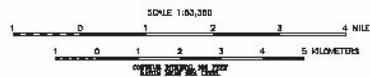


SURVEY HISTORY

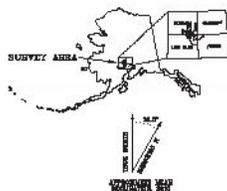
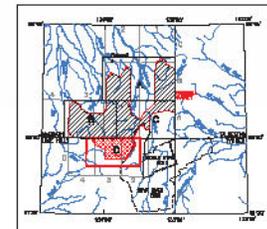
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS) and Flagra Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2013, 2013, and 2014. Previously, Flagra Geoservices, Inc. acquired the current survey data shown in this location map by Flagra Geoservices, Inc. and data of publication. The project was funded by the Alaska State Department of Natural Resources and the Alaska State Department of Geological and Geophysical Surveys Inventory Program. Copyright Flagra Geoservices, Inc. (CGG) and the State of Alaska. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through CGG, 2200 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the CGG website (www.dgggs.state.ak.us). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat (.PDF) file format.



DATE: 2014-05-28, SURVEY AREA: FAREWELL, SOUTH-CENTRAL ALASKA, UTM ZONE 53, UTM PROJECTION: UTM, UTM DATUM: NAD83, UTM SCALE: 1:50,000



LOCATION INDEX FOR 1:63,560-SCALE MAPS



URANIUM (eU) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, CGG, and Fugro GeoServices, Inc.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-300 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 10.8L (1024 cubic inches) of NaI (samarium) tail crystal detector, and 43L (208 cubic inches) of upward looking (rodar) detector. After application of Neke Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2412-2810 keV), uranium (1460-1850 keV), potassium (1370-1570 keV), total radioactivity (400-2815 keV) and cosmic radiation (3000-4600 keV). Counts from the rodar detector were recorded in the entire window (1860-1961 keV). The rodar detection system was calibrated following methods outlined in MEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometry, Technical Report 323, International Atomic Energy Agency, Vienna.

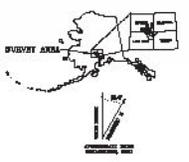
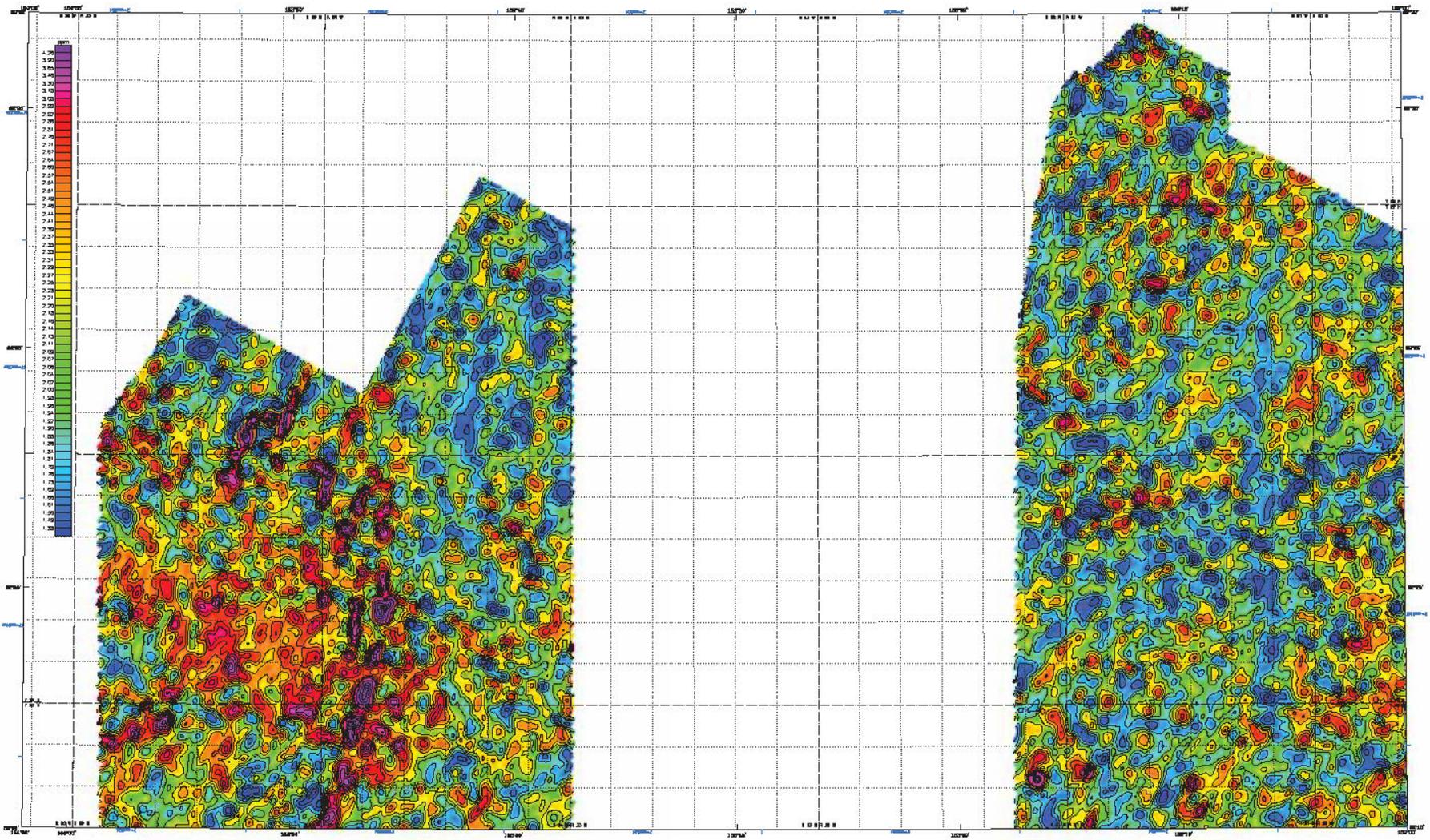
DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium gamma-ray spectrometer, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from rodar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AG-350/353 Squirrel helicopter at a mean terrain clearance of 200 feet along low-level 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 1 mile.

A Novatel OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 53) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG 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 Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins 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.



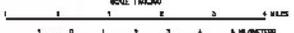
DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro Global magnetometer with a bottom 200 ocean sensor, and a Radiation Systems RS-200 primary-secondary spectrometer. Some flights acquired the secondary data with an Explorer EM-300 spectrometer. The EM and magnetometer sensors were flown at a height of 100 feet. The primary spectrometers were flown at a height of 200 feet. In addition, 100-metre spaced 0.50 m resolution 100-1000 Hz resistivity data were collected using a 100-1000 Hz resistivity system and 100-1000 Hz resistivity data were collected using a 100-1000 Hz resistivity system with a spacing of a quarter of a mile. The data were then interpolated to the 100-metre grid.

A 100-metre spaced 0.50 m resolution 100-1000 Hz resistivity data were collected using a 100-1000 Hz resistivity system with a spacing of a quarter of a mile. The data were then interpolated to the 100-metre grid.

RADIOMETRICS

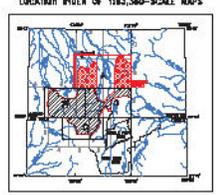
The gamma-ray spectrometry data were recorded at a 1.0 second count rate. A Radiation Systems RS-200 primary-secondary spectrometer was the primary instrument used. Lower resolution RS-200 spectrometers were used for some flights. Data were corrected with 14.6% (2000 data) and 14.6% (1000 data) decay corrections. After correction of the data, the data were then converted to a 100-metre grid. The data were then interpolated to the 100-metre grid.



URANIUM (eU) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014



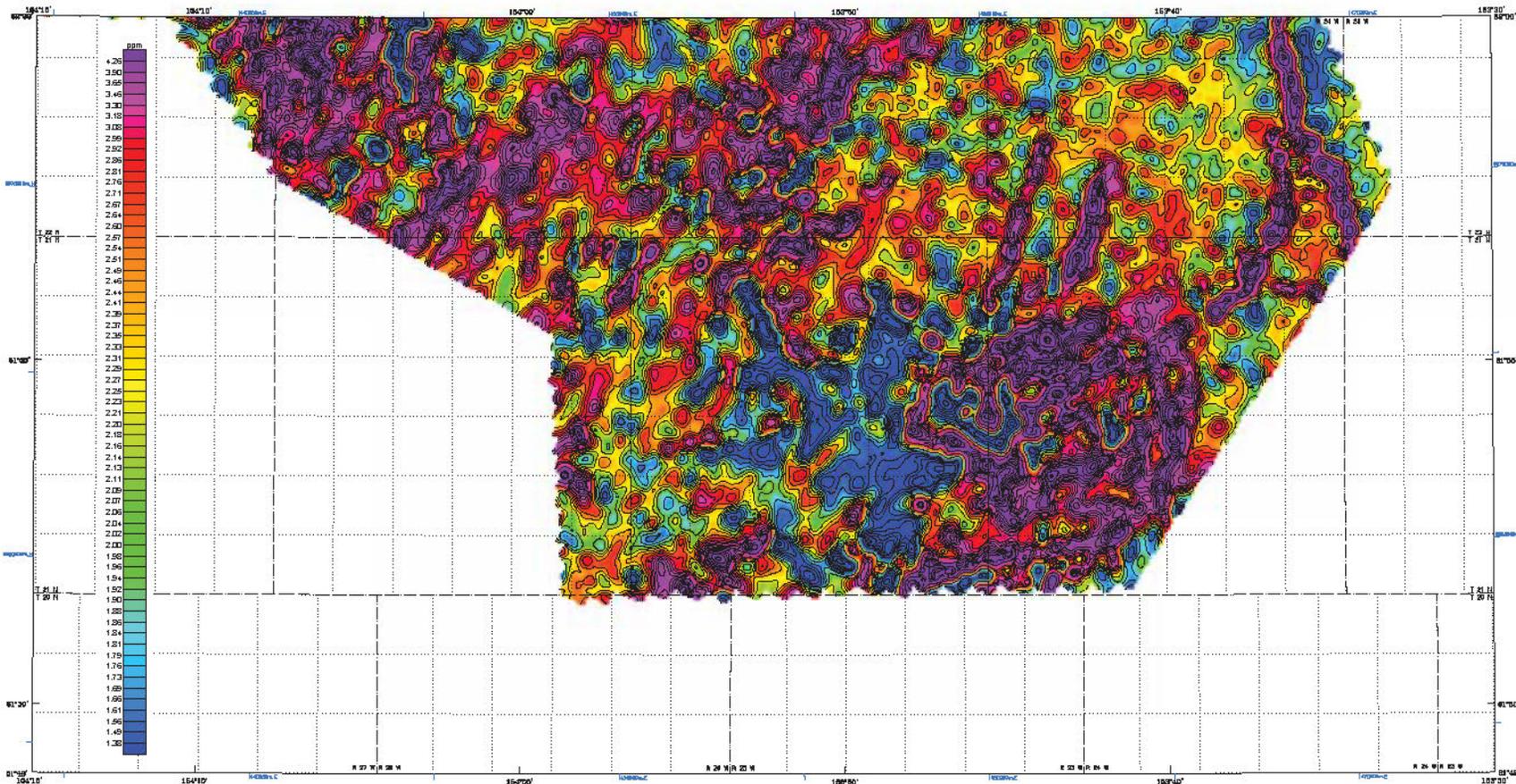
SURVEY HISTORY

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 Geometrics, Inc. Airborne geophysical data for the area were collected and processed by CGS in 2012, 2013, and 2014. The current survey was shown in the location map for the Farewell Survey Area, and data for the survey were collected by the Alaska State Department of Natural Resources and Geological Survey Inventory Program. Data were acquired by Fugro Geometrics, Inc. (Fugro) in 2014.

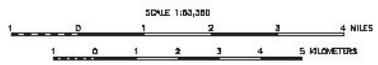
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (www.dggs.alaska.gov). Maps are also available on paper through the DGGS office or through the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (www.dggs.alaska.gov).

CONTOUR INTERVAL

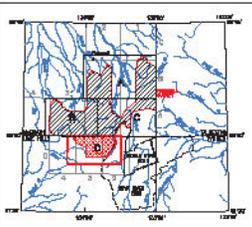
.....	0.50 ppm
.....	1.00 ppm
.....	0.20 ppm



Uranium concentration contours are shown in ppm. Contour interval is 0.25 ppm. Contour lines are labeled with values.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



URANIUM (eU) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an RS-350/83 Squirrel helicopter at a mean terrain clearance of 200 feet along 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an oak constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of NaI Adjusted Single Voxel Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (2000->8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1981. *Alphabetic Surveying Spectrometer Surveys*. Technical Report 323. International Atomic Energy Agency, Vienna.

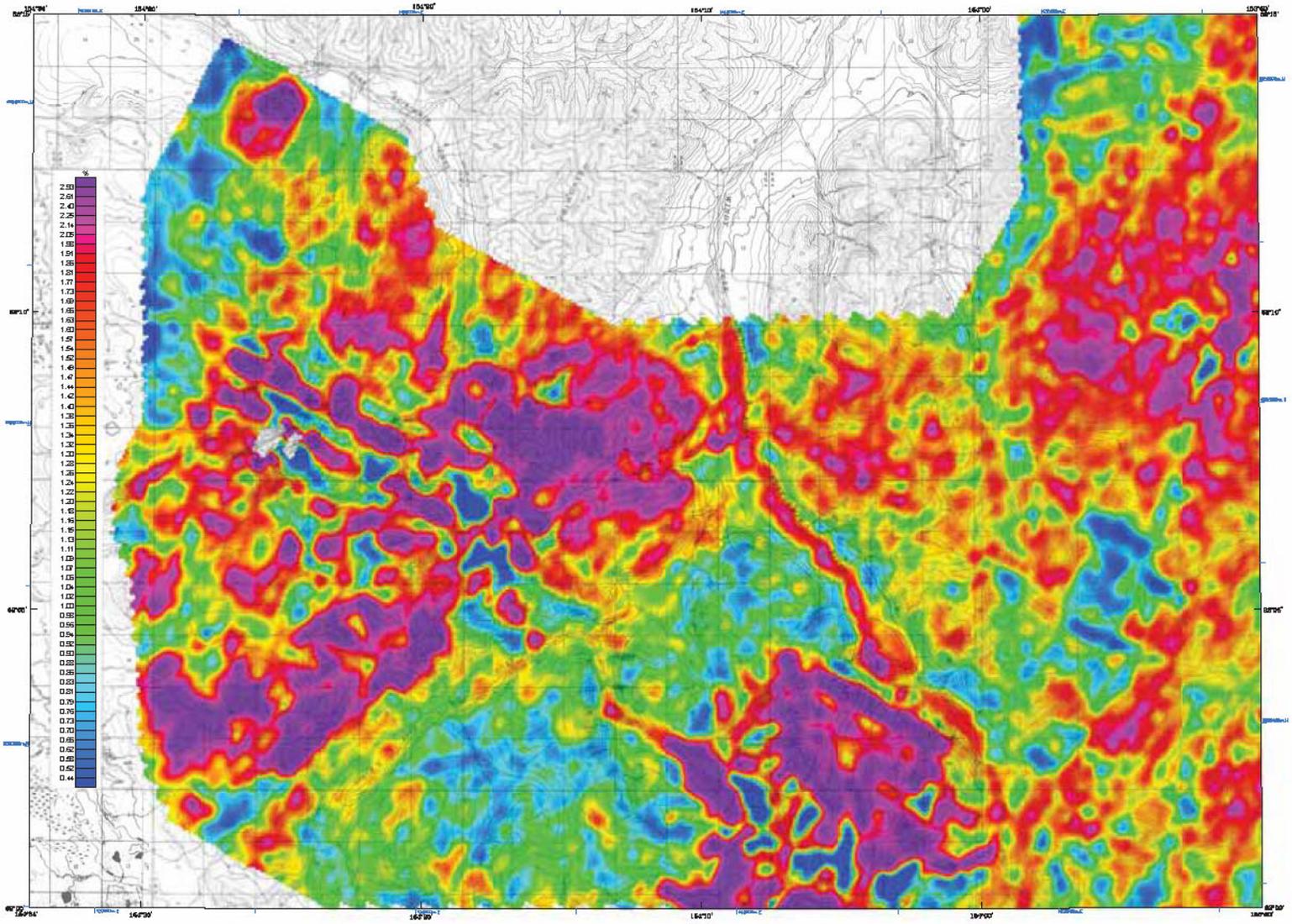
CONTOUR INTERVAL

.....	0.00 ppm
.....	1.00 ppm
.....	0.25 ppm

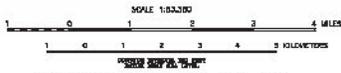
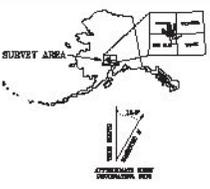
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3304 Collins 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 effort, and are viewable online at the website in Adobe Acrobat PDF file format.



See Sheet 21B, Radiometric Survey Methods, A-C, 1998, A-A, 1999, and Sheet 2-A, 1994, Spectrometry, 1994.



**POTASSIUM (% K)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laural E. Burns, CGG, and Fugro Geosciences, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DORIS™ Electronic Systems (ES) system, a Fugro D'Adda magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorer™ RS-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an Airbus A319 aircraft. The flight path was flown in a zig-zag pattern with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

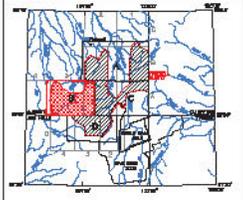
A Novatel OEM4-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152° 0' north-south, of 0 and an east constant of 600,000. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-300 spectrometer was the primary instrument used, however an Explorer RS-300 spectrometer was used for some flights. Both were configured with 18.8L (1226 cubic inches) of high-purity germanium (HPGe) crystal detector, and 4.3L (256 cubic inches) of sodium iodide (NaI) crystal detector. After application of live-time and single pulse discrimination to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1460-1860 keV), potassium (4770-1670 keV), total radioactivity (400-2818 keV) and cosmic radiation (3000-3400 keV). Counts from the NaI detector were recorded in the rock window (1180-1860 keV). The rock detection system was calibrated following methods outlined in NEA Report 302. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and distance from the ground survey elevation of 300 feet. The data were then converted to atomic concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 20 m cell size to produce the maps and first grids contained in this publication.

International Atomic Energy Agency, 1991. *Atomic Weights and Radiometric Methods*. Technical Report 25. Vienna: International Atomic Energy Agency, Vienna.

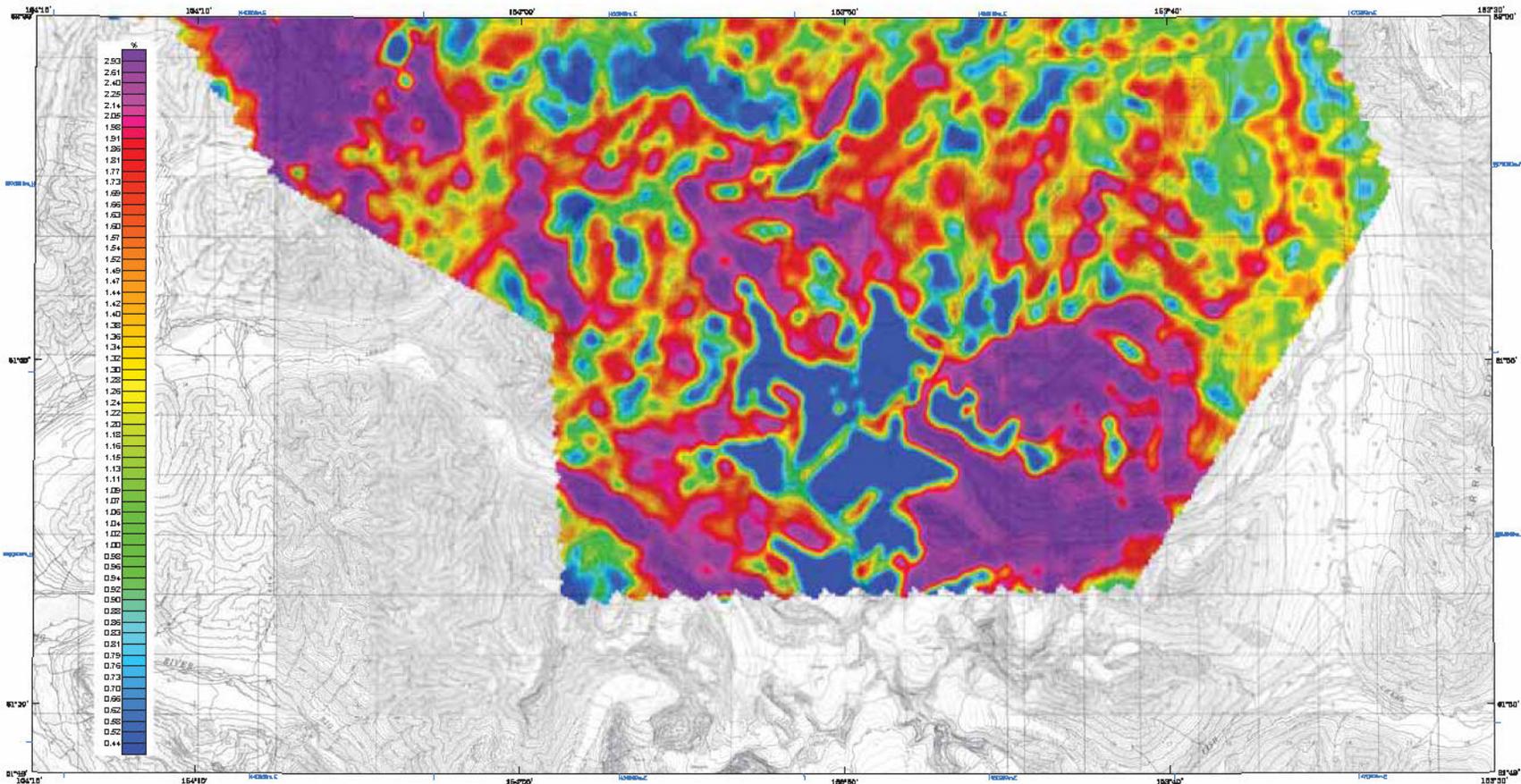
LOCATION INDEX FOR 1:63,360-SCALE MAPS



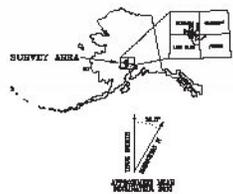
SURVEY HISTORY

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 Geosciences, Inc. All former geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Fugro Geosciences, Inc. DGGG surveys conducted to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Petroleum Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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 available online at the website in Adobe Acrobat (.PDF) file format.

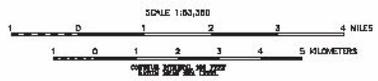


DATE: 2014-05-08, SURVEY AREA: FAREWELL, COORDINATE SYSTEM: UTM, UTM ZONE: 53, DATUM: NAD83, UTM X: 1540000, UTM Y: 6130000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitex CS3 cesium gamma-ray spectrometer, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric surveys were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an SR-350/333 Squairral helicopter at a mean terrain clearance of 200 feet along 1/4 mile 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 53) spheroid, 1927 North American datum using a central meridian (CM) of 152, a north constant of 0 and an oak constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.



**POTASSIUM (% K)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

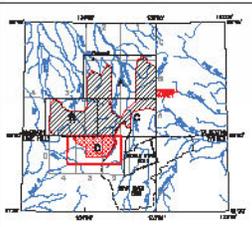
by
Lauri E. Burns, CGG, and Fugro GeoServices, Inc.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 10.8L (1024 cubic inches) of NaI (scintillator) NaI crystal detector, and 4.3L (268 cubic inches) of upward looking (rodent) detector. After application of Neke Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (241-2810 keV), uranium (1460-1850 keV), potassium (1370-1570 keV), total radioactivity (400-2815 keV) and cosmic radiation (3000-5400 keV). Counts from the rodent detector were recorded in the entire window (1460-1850 keV). The rodent detector system was calibrated following methods outlined in MEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

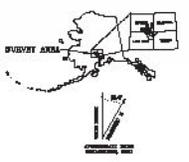
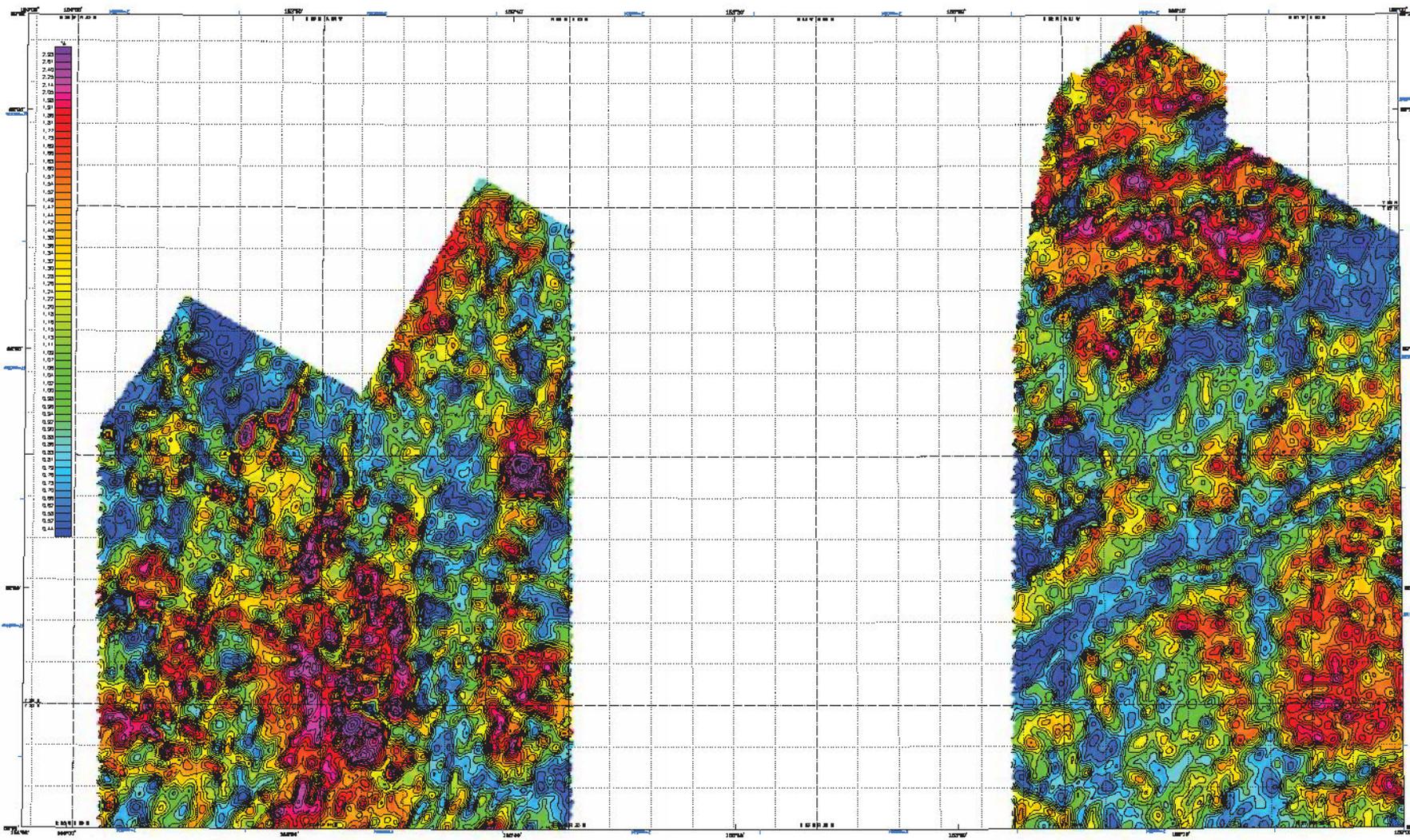
International Atomic Energy Agency, 1991, Airborne Gamma-Ray Spectrometry, Technical Report 323, International Atomic Energy Agency, Vienna.

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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 DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3364 Collins Road, Fairbanks, Alaska, 99703-3707, 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.



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSPEC Electromagnetic (EM) system, a Fugro Global magnetometer with a bottom 200 ocean sensor, and a Radiation Systems RS-200 ground-truth spectrometer. Some flights acquired the radiometric data with an Exploration 05-200 spectrometer. The EM and radiometric surveys were flown at a height of 100 feet. The geometry specifications were flown at a height of 200 feet in certain EM survey segments. Data from Polar 200, 240, and 260 channels and 2400 channels flights were processed with an RS-200-03 Radiometric Interpreter at a 1000-foot resolution of 200 feet using 100-200 meter survey lines. The data were then interpolated to the flight line at intervals of approximately 2 miles.

A detailed 0.250-0.500 Channel Radiometric Database was used for processing. The radiometric database was derived using 1.0-1.0 meter (1.0-1.0 meter) differential conductivity to a relative accuracy of better than 3 m. Digital radiometric data were projected onto the GCS83 datum (NAD83 zone 5) eastward, 1927 North American datum using a central meridian (CM) of 153° 00' west (eastern of 0) and an apex constant of 350,000. Relative accuracy of the projected data is better than 10 m with respect to the UTM grid.

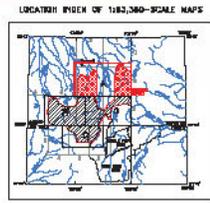
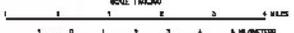
RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second count rate. A Radiation Systems RS-200 gamma-ray spectrometer was the primary instrument used. However, an Exploration 05-200 spectrometer was used for some flights. Data were corrected with 14.6% (2000 data points) of non-observed for specific detector gain (2.0% data below) of general loading (Gamma) detector. After operation of the RS-200, the data were decomposed to the spectra, counts per minute detector were recorded in the spectra corresponding to channel (1000-2000 keV), uranium (1000-1800 keV), potassium (1070-1070 keV), total (1000-2000 keV) and cosmic neutron (2000-4000 keV). Counts from the total detector were recorded in the count stream (1000-1800 keV). The total detector system was calibrated to the radiometric database. After correction of the background, the data were corrected for spectral interference, absorption in components, geometry, and distances from the detector survey altitude of 100 feet. The data were then processed to a 100 m grid using a minimum curvature technique. All data were then resampled from the 100 m grid area down to a 20 m grid size to produce the maps and grid contours in the publication.

POTASSIUM (% K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGA and Fugro Geometrics, Inc.
2014



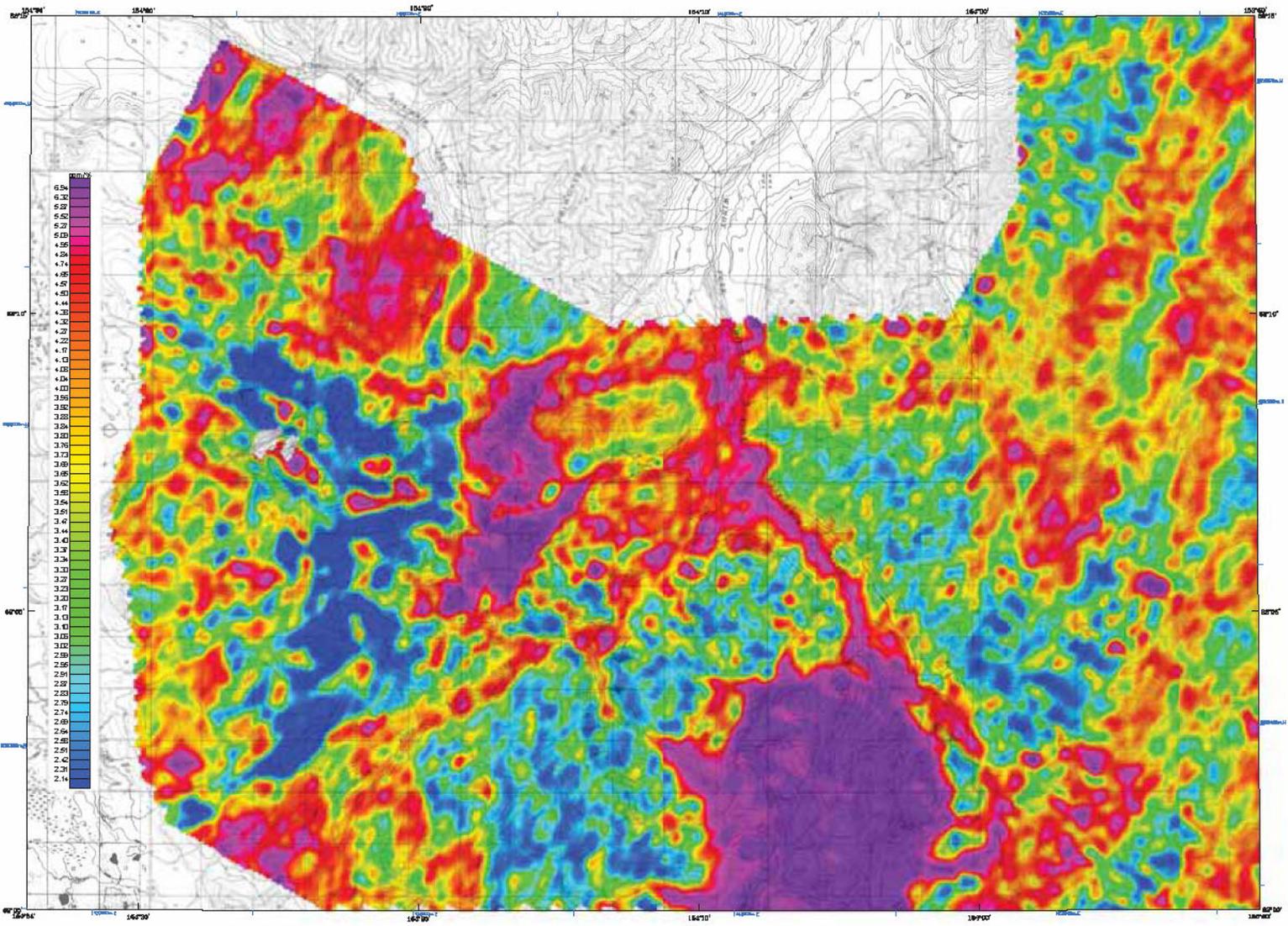
SURVEY HISTORY

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 Geometrics, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. Fugro's work was done in accordance with the current survey area shown in the location map. The project was funded by the Alaska State Department of Geology, Geophysics and Earth Sciences Assessment project, which is part of the Alaska Airborne Geophysical and Geospatial Inventory Program. Geospatial Inc. (GSI) contributed funding for a portion of the work.

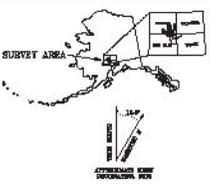
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (www.dgggs.state.ak.us). Maps are also available on paper through the DGGGS office or through the State of Alaska's online map service.

CONTOUR INTERVAL

.....	0.20 %
.....	0.30 %
.....	0.10 %



See Sheet 14B, Radiometric Survey Methods, A-C, 1998, A-D, 1999, and Sheet A-4, 1994, for Symbols, Units.



DESCRIPTIVE NOTES

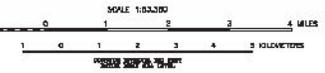
The geophysical data were acquired with a DORAD® ElectroMagnetic (EM) system, a Fugro D1-300 magnetometer with a Scripps D30 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium 20-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 SuperPuma helicopter at a mean barolo clearance of 2500 feet along NW-SE (120°) 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 OEM-62L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 Mean Sea Level datum using a central meridian (CM) of 153° 0 north-south, or 0 and an east constant of 600,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A resolution 100-200 gamma-ray spectrometer was the primary instrument used, however a Dabco 10-400 spectrometer was used for some flights. Both were configured with 1041 (101% cubic inches) of NaI (downward) NaI crystal detector and 4.3 (358 cubic inches) of upward looking (rod) detector. After application of live/adjustable Simulr Live Discrimination to the spectra, counts from the main detector were recorded in five minutes corresponding to thorium (240-2810 keV), uranium (1800-1850 keV), potassium (1370-1570 keV), total radioactivity (540-2810 keV) and cosmic radiation (3000-5000 keV). Counts from the rod detector were recorded in the main window (1660-1860 keV). The rod detector system was calibrated following methods outlined in IAG Report 333. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and dispersion from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpreted to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this package.

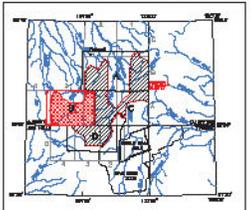
International Atomic Energy Agency, 1987. Airborne Gamma Ray Spectrometry. Technical Report 262. International Atomic Energy Agency, Vienna.



**THORIUM / POTASSIUM (eTh / % K)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES**

by
Lauri E. Burns, OGS, and Fugro Geosciences, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS

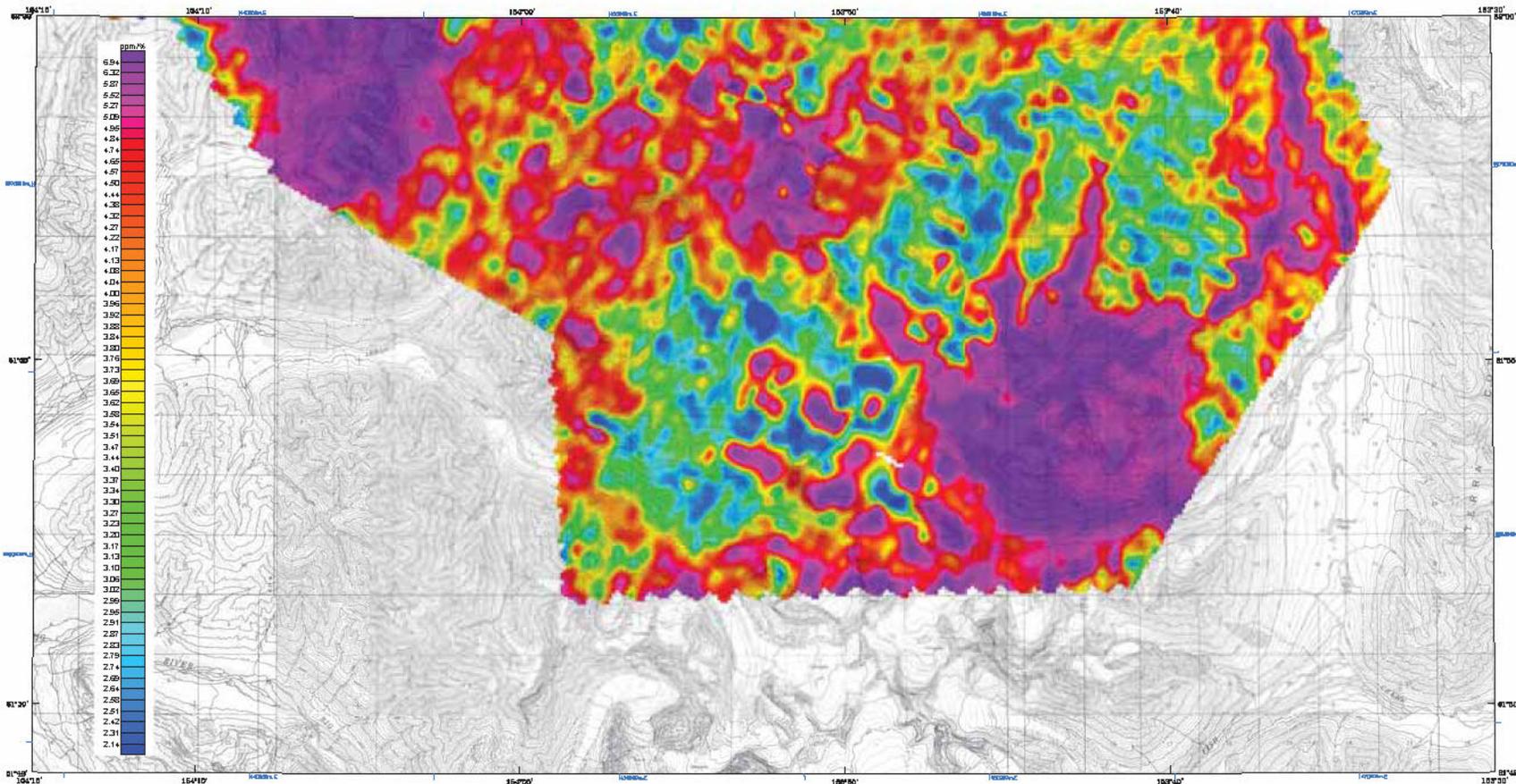


SURVEY HISTORY

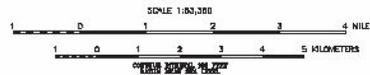
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geosciences, Inc. Airborne geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3364 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office and are available online at the website in Adobe Acrobat .PDF file format.

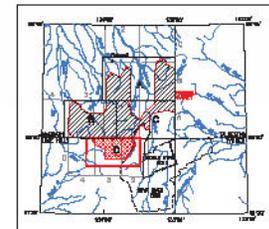
THORIUM / POTASSIUM (eTh/K)
Measured radionuclide concentrations for potassium and thorium will vary systematically with variations in soil thickness and moisture content. The ratio parameter below is a measure of enrichment of one radionuclide relative to another.
A blank region indicates an area where the summed concentrations fall below threshold required for a meaningful calculation of the ratio.



DATE: 2014-08-14, TIME: 10:00 AM, INSTRUMENT: EG&G ORTEC P-8, DATA: P-8, UTM ZONE: 18Q, UTM X: 700,000, UTM Y: 61,300,000



LOCATION INDEX FOR 1:63,360-SCALE MAPS



THORIUM / POTASSIUM (eTh / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitetsu CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-B20 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an S-350/33 Squirrel helicopter at a mean terrain clearance of 200 feet along 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-B20 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of high (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of Naive Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2415-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (3000->8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detection system was calibrated following methods outlined in WEA Report 322. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size to a 25 m cell size to produce the maps and final grids contained in this publication.

Interrelated Alaska Energy Agency, 1981, Alaska Bureau of Geocronometer Surveys, Technical Report 322, Interrelated Alaska Energy Agency, Fairbanks.

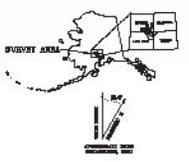
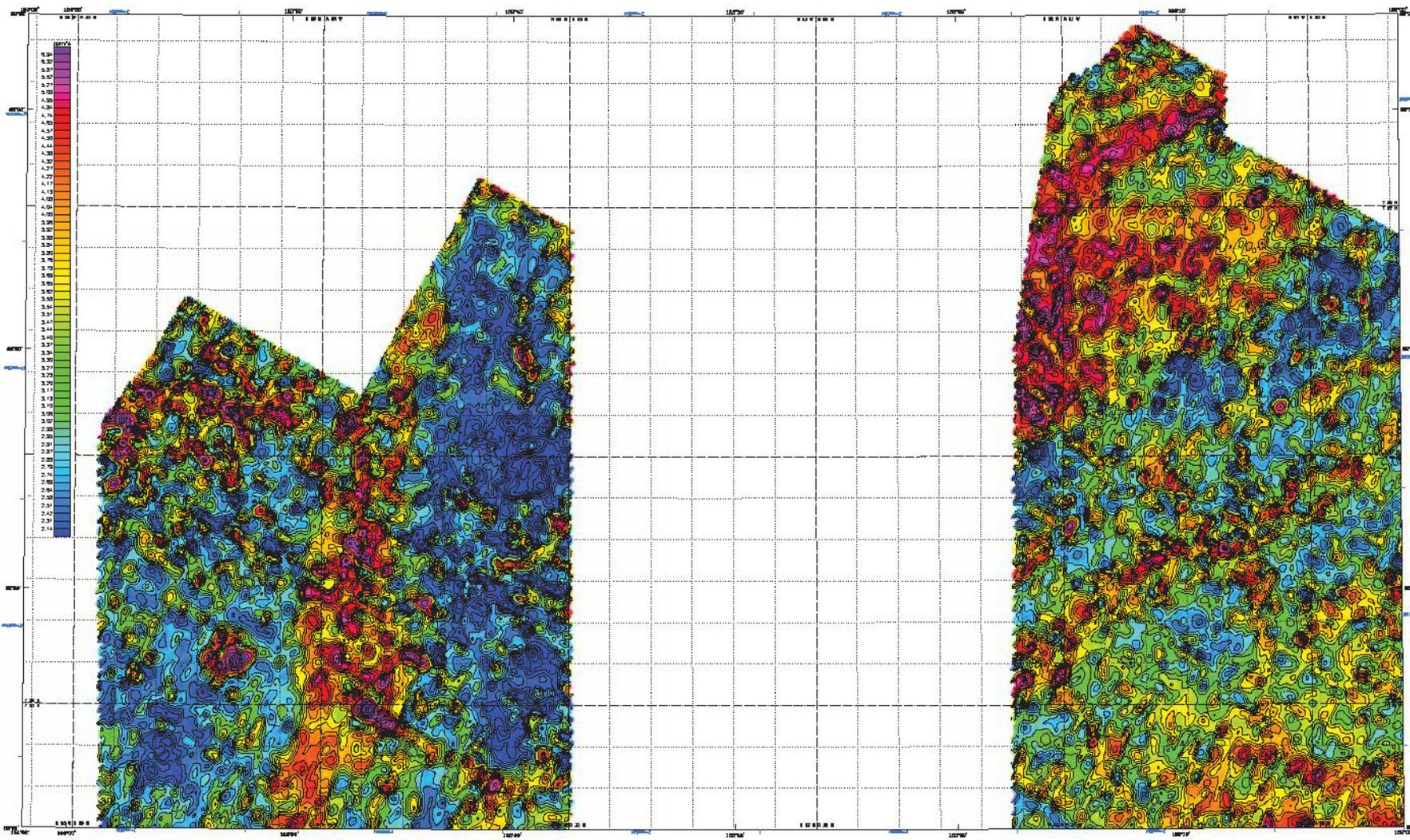
THORIUM / POTASSIUM (eTh/K)

Measured radionuclide concentrations for potassium and thorium will vary symbiotically with variations in soil lithology and moisture content. The ratio parameter indicates areas of enrichment or area radiometric relative to another. A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

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 DGGS in 2012, 2013, and 2014. 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 project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIR) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3364 Collins 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 GEOSIR Electromagnetic (EM) system, a Fugro Global magnetometer with a bottom 200 gauss sensor, and a Radiation Scanner (RS-200) gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorer 60-200 spectrometer. The EM and radiometric surveys were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition, the survey covered 5000 feet below 200 feet of water and 1000 feet below 1000 feet of water. The EM and radiometric data were collected on a track with a spacing of 200 feet. The EM data were collected at a spacing of 0.5 miles. The radiometric data were collected at a spacing of 0.5 miles. The EM data were collected at a spacing of 0.5 miles. The radiometric data were collected at a spacing of 0.5 miles.

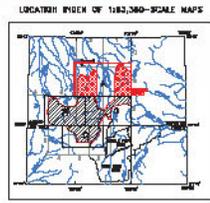
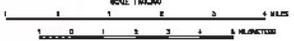
RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second count rate. A Radiation Scanner RS-200 gamma-ray spectrometer was the primary instrument used. Lower resolution RS-200 spectrometers were used for some flights. Data were collected with 14.6m (1000 feet) of lead shielding for gamma detection and 4.4m (14 feet) of copper leaded glass detector. After operation of the detector, the data were transferred to the computer. The data were then processed to produce the maps and data contours in this publication.

**THORIUM / POTASSIUM (eTh / % K)
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGA and Fugro Geoscience, Inc.
2014



THORIUM / POTASSIUM (eTh/K)

Measured radiometric concentrations for potassium and thorium are very approximately with variations in soil thickness and moisture content. The radiometric method is subject to variations of soil radiometric content in contouring.

A blank region indicates an area where the assumed concentration is below threshold required for a meaningful calculation of the ratio.

CONTOUR INTERVAL

.....	0.5 ppm/K
.....	1.0 ppm/K
.....	1.5 ppm/K

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 Geoscience, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. Previous data were collected and processed by the Alaska State Department of Natural Resources and Geophysical Inventory Program. Some data were acquired by the Alaska State Department of Natural Resources and Geophysical Inventory Program. Some data were acquired by the Alaska State Department of Natural Resources and Geophysical Inventory Program.

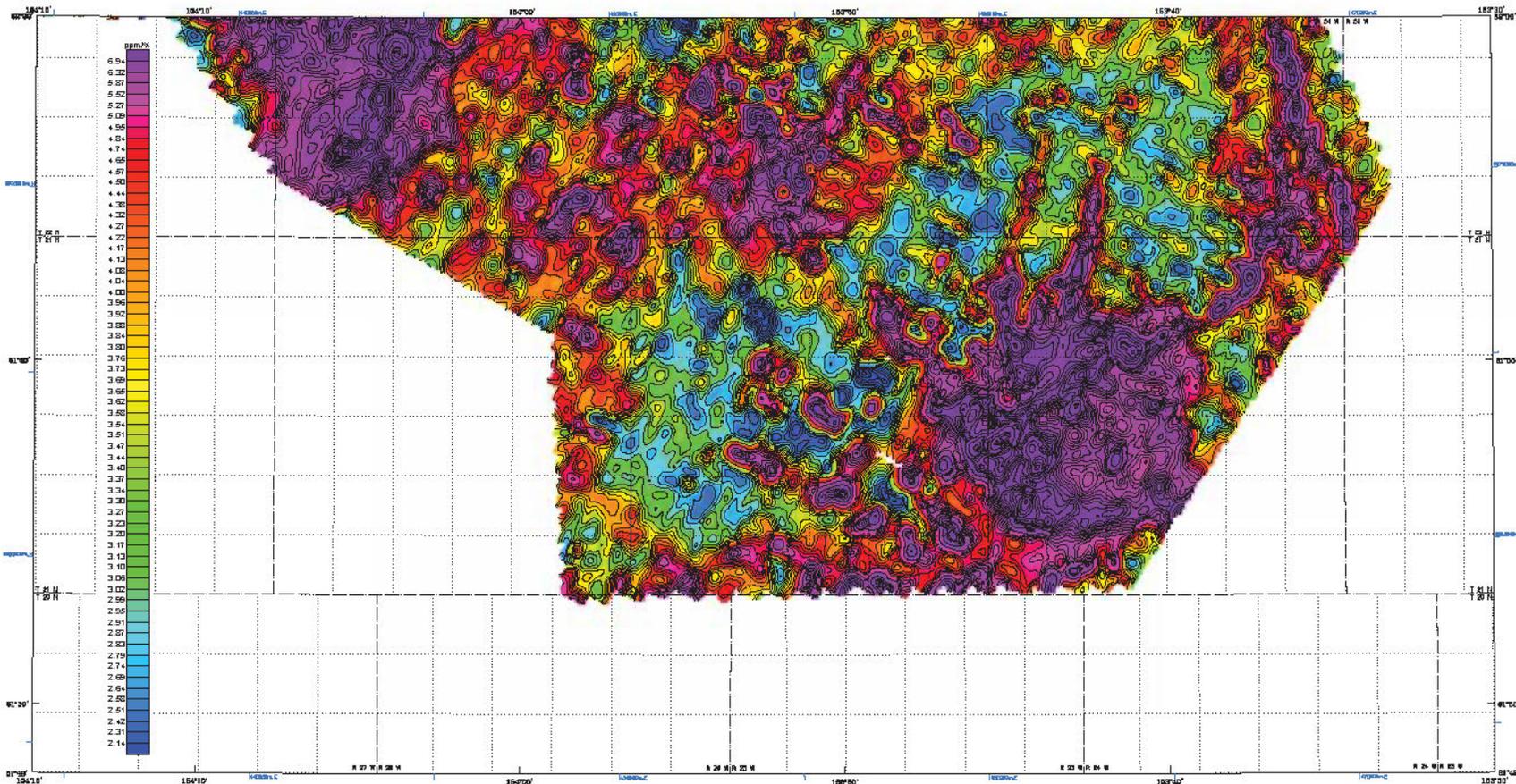
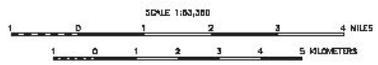
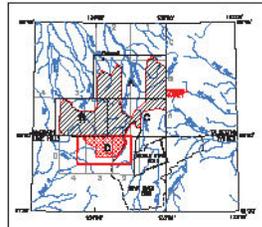


FIGURE 1. Thorium / Potassium (eTh / % K) with data contours, Farewell Survey Area, South-Central Alaska. Contour interval = 0.2 ppm/K. Contour labels are in ppm/K.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



THORIUM / POTASSIUM (eTh / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters, GPS navigation systems, 50/80 Hz magnetometers and video cameras. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. In flight, position coordinates were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an oak constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (crystal) detector. After application of NaI Adjusted Single Voxel Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2415–2810 keV), uranium (1860–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2615 keV) and cosmic radiation (3000–5000 keV). Counts from the naion detector were recorded in the naion window (1650–1850 keV). The naion detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1981. *Alaska Bureau of Geophysical Surveys, Technical Report 323, International Atomic Energy Agency, Vienna.*

THORIUM / POTASSIUM (eTh / % K)

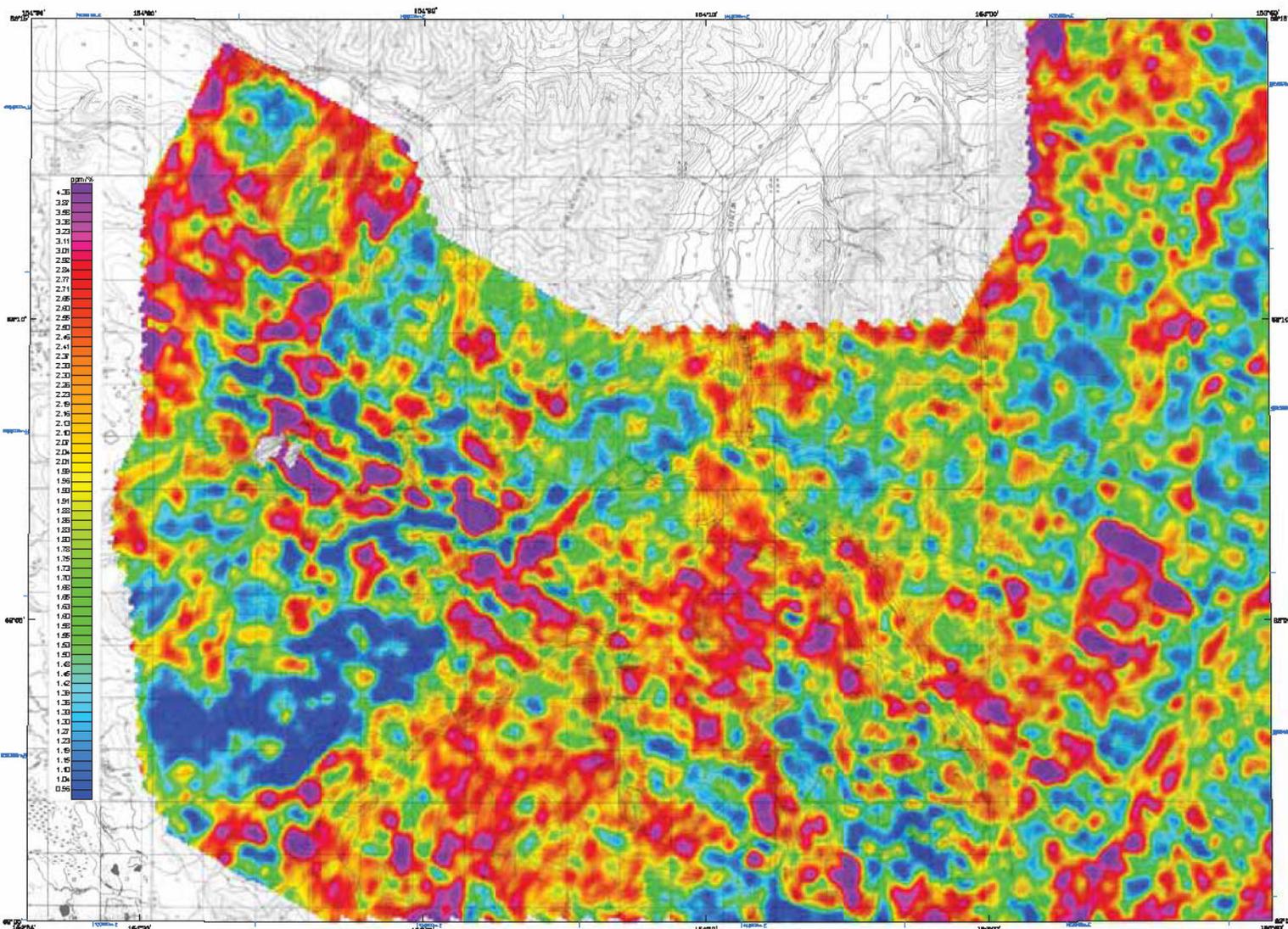
Measured radiometric concentrations for potassium and thorium will vary systematically with variations in soil thickness and moisture content. The ratio potassium/ thorium is a measure of enrichment of one radioclement relative to another. A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

CONTOUR INTERVAL

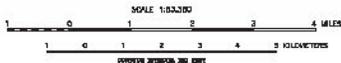
.....	0.2 ppm/K
.....	1.0 ppm/K
.....	0.2 ppm/K

SURVEY HISTORY

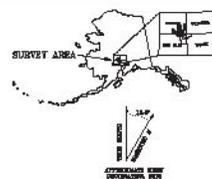
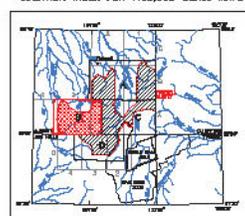
This map has been compiled and done under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins Road, Fairbanks, Alaska, 99705-3707, 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.



See Sheet 216, Radiometric Survey Methods, A-C, 1998, A-D, 1999, Methods A-C, 1997, Supplemental Data.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



**URANIUM / POTASSIUM (eU / % K)
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES**

by
Laural E. Burns, OGS, and Fugro Geoservices, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DISHBY Electronics (EVI) system, a Fugro D1 300 magnetometer with a Scripps 300 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium 30-300 spectrometer. The EVI and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an R550-Bi Squared helicopter at a mean barolo clearance of 2500 feet along 100-50 (100) 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 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153° 0' north-south, and a scale constant of 0.999603. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-300 gamma-ray spectrometer was the primary instrument used, however a Dabco 10-400 spectrometer was used for some flights. Both were configured with 1041 (1014 cubic inches) of NaI (downward) NaI crystal detector, and 4.3 (358 cubic inches) of upward looking (rod) detector. After application of live/advance signal live discrimination to the spectra, counts from the main detector were recorded in five minutes corresponding to thorium (240-2810 kcp), uranium (1800-1850 kcp), potassium (1370-1370 kcp), total radioactivity (3400-3810 kcp) and cosmic radiation (3000-3000 kcp). Counts from the rod detector were recorded in the main window (1660-1660 kcp). The rod detector system was calibrated following methods outlined in IGA Report 333. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and dispersion from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m grid size down to a 25 m cell size to produce the maps and final grids contained in the package.

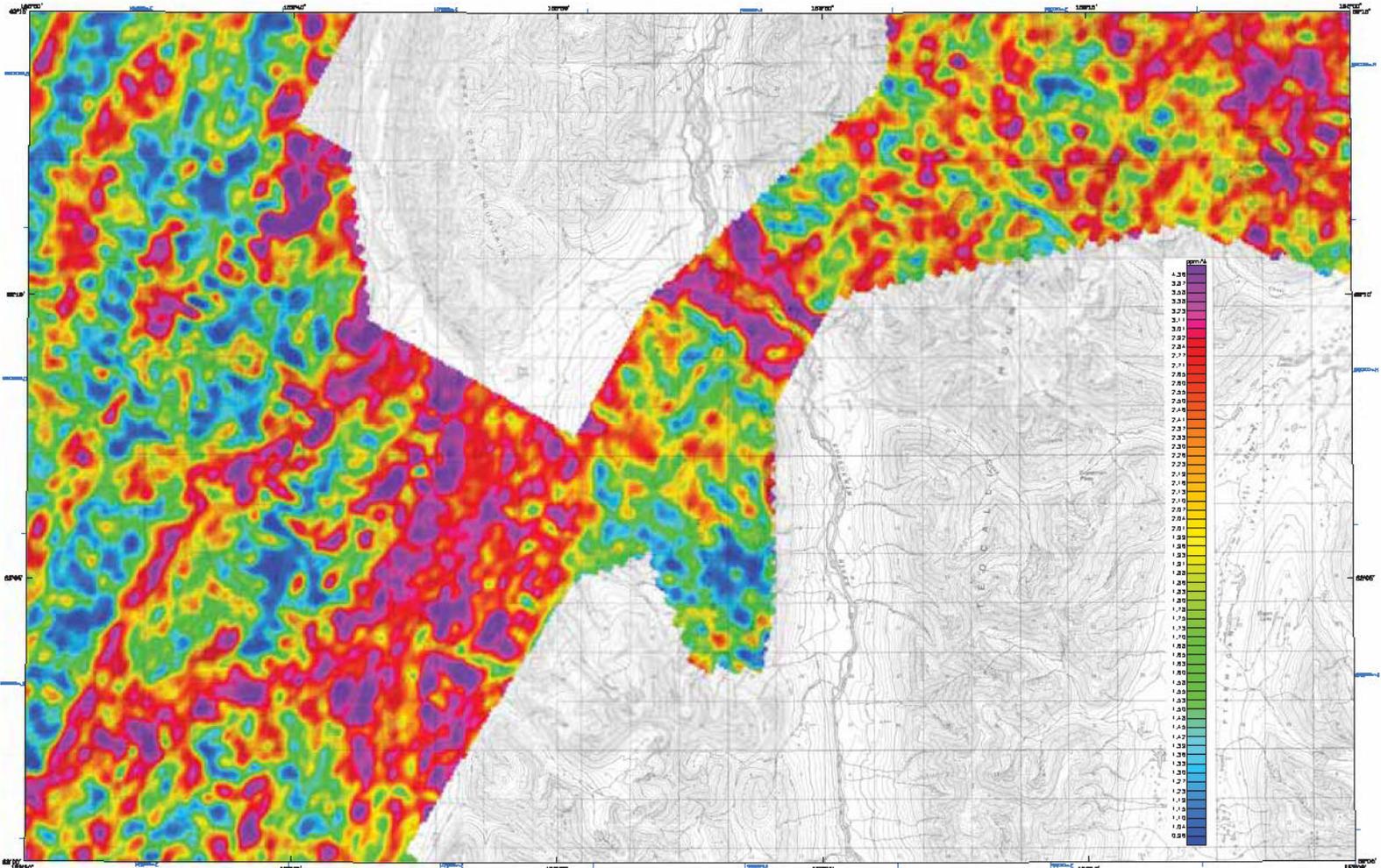
International Atomic Energy Agency, 1981. Airborne Gamma Ray Spectrometry. Technical Report 252. International Atomic Energy Agency, Vienna.

URANIUM / POTASSIUM (eU/K)

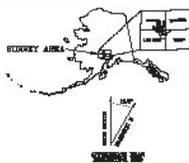
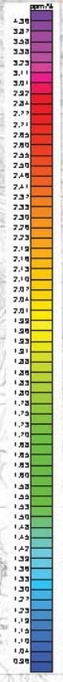
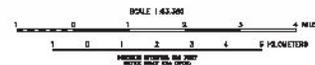
Measured radiometric concentrations for uranium and potassium will vary significantly with variations in soil thickness and moisture content. The ratio parameter below is a measure of enrichment of one radiometric relative to another. A blank region indicates an area where the summed concentrations fall below threshold required for a meaningful calculation of the ratio.

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 DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geological and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the work. 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 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat .PDF file format.



Scale from U.S. Geological Survey GSA 1:250,000, 1984, Washington, Alaska.



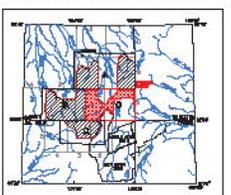
DESCRIPTIVE NOTES
 The geophysical data were acquired with a GEOSPEC Electromagnetics (EM) system, a Fugro D1244 magnetometer with a battery pack, a dual channel and a Radiation Solutions RB-200 gamma-ray spectrometer. The flight altitude was approximately 100 feet with an exposure rate of 100 R/hr. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 30-foot video cameras and video cameras. Flights were performed with an RB-200-33 (30-foot) helicopter at a mean terrain clearance of 200 feet along the RB-200 (1977) 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 Hottel DEHS-221 Check Pointing System was used for navigation. The helicopter position was observed every 6-8 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path positions were collected using the Global Positioning System (GPS), 1982 North American datum using a 20 m grid size to produce the more and true grids contained in this publication. The flight path was collected at 10 m with respect to the UTM grid.

RADIOMETRICS
 The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RB-200 gamma-ray spectrometer was the primary instrument used, however, a Spectrum 40-200 spectrometer was used for some flights. Both were configured with 10.26 (1024 ratio behind) of lead (covered) by optical detector, and 422 (200 ratio behind) of cesium iodide (crystal) detector. After acquisition of data Adjusted Single Value (dependent on the detector), counts from the main detector were recorded in the windows corresponding to uranium (200-2800 cps), potassium (180-1800 cps), potassium (1700-1700 cps), total radioactivity (500-2015 cps) and source radiation (5000-2000 cps). Counts from the cesium detector were recorded in the main window (1800-1800 cps). The radio detector system was calibrated following methods outlined in USA Report 323. After removal of the background, the data were corrected for scattered interference, changes in temperature, pressure, and distance from the detector. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m grid size down to a 20 m grid size to produce the more and true grids contained in this publication.

**URANIUM / POTASSIUM (eU / % K)
 WITH TOPOGRAPHY,
 FAREWELL SURVEY AREA,
 SOUTH-CENTRAL ALASKA
 PARTS OF MCGRATH AND LINE HILLS QUADRANGLES**

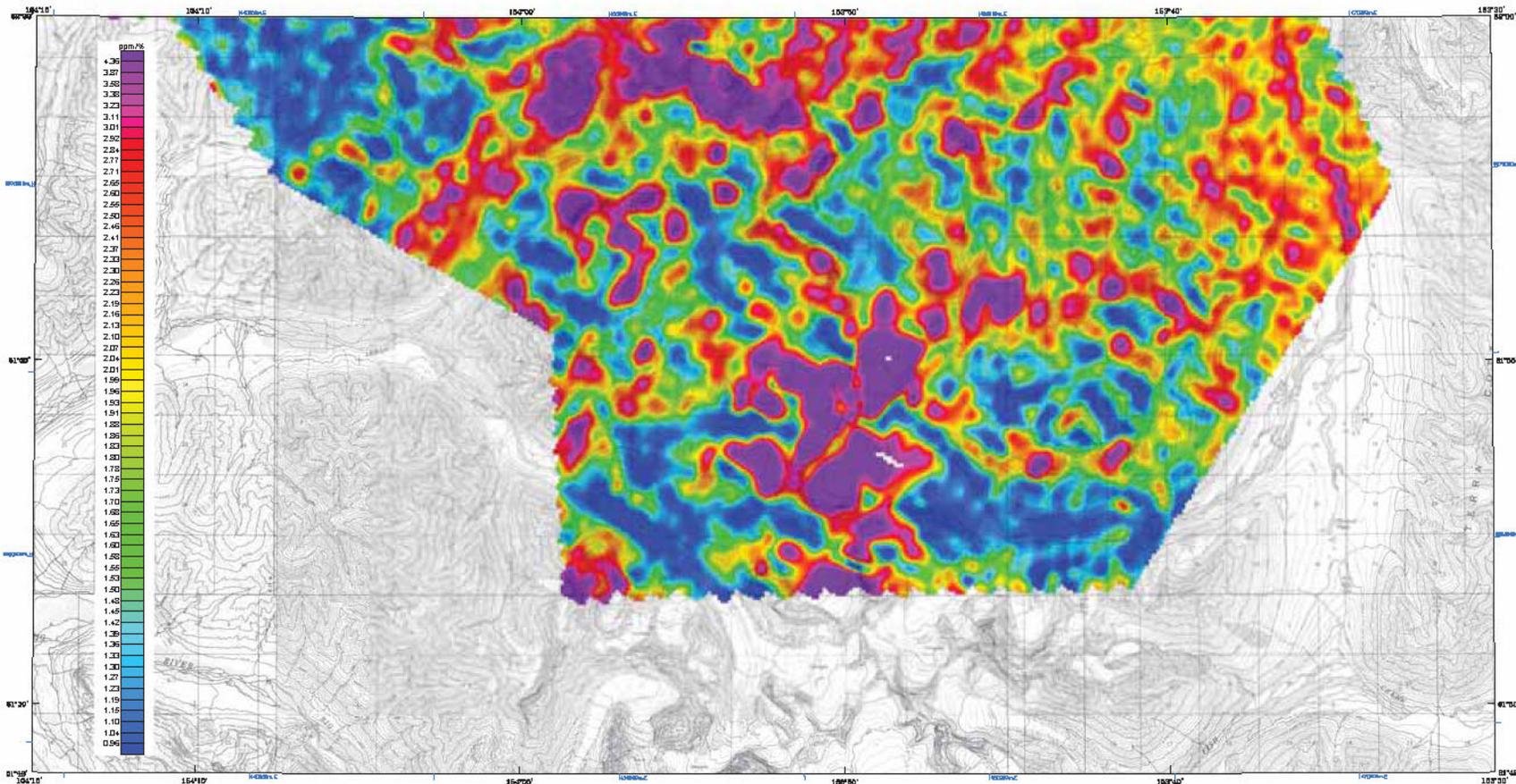
by
 Laurel E. Burns, CSO, and Fugro Geoservices, Inc.
 2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS

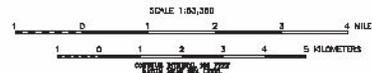


URANIUM / POTASSIUM (eU/%K)
 Measured rock/soil concentrations for uranium and potassium are very approximately with variations in soil thickness and moisture content. The ratio parameter indicates degree of enrichment of one radioelement relative to another. A blank region indicates an area where the assumed concentrations fall below thresholds required for a meaningful calculation of the ratio.

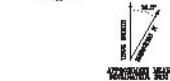
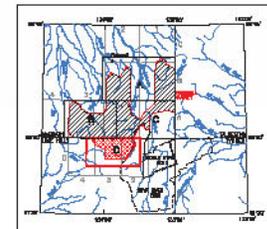
SURVEY HISTORY
 This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geoservices, Inc. (Fugro). Geophysical data for the area were collected and processed by DGGGS in 2010, 2013, and 2014. Previously, many DGGGS surveys conducted in the current survey area shown in the location map by Stephen Fisher, survey number, and date of publication. The project was funded by the Alaska State Department of Natural Resources and Geophysical Surveys as part of the Alaska Geologic and Geophysical Inventory Program. Cook Inlet Pipeline, Inc. (CIP) conducted funding for a portion of the area. All data and maps produced to date from DGGGS are available in digital format in DGGGS for a central file through DGGGS, 2200 Denig Street, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dggs.state.ak.us/). Maps are also available on paper through the DGGGS office, and are available online at the website in Alaska, Alaska, and the website.



DATE: 2014-08-08 10:00 AM
 PROJECT: 2014-2-16D
 DRAWN BY: J. BURNS
 CHECKED BY: J. BURNS



LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saiprote CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an S-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along major 1200' 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Eight north positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152.9, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of high (downward) kil crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of House Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (3000->8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detection system was calibrated following methods outlined in NEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size data to a 25 m cell size to produce the maps and final grids contained in this publication.

Interrelated Alaska Energy Agency, 1981, Alaska Bureau of Geochronology Surveying, Technical Report 323, Interrelated Alaska Energy Agency, Fairbanks.

**URANIUM / POTASSIUM (eU / % K)
 WITH TOPOGRAPHY,
 FAREWELL SURVEY AREA,
 SOUTH-CENTRAL ALASKA
 PARTS OF MCGRATH AND LIME HILLS QUADRANGLES**

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

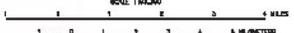
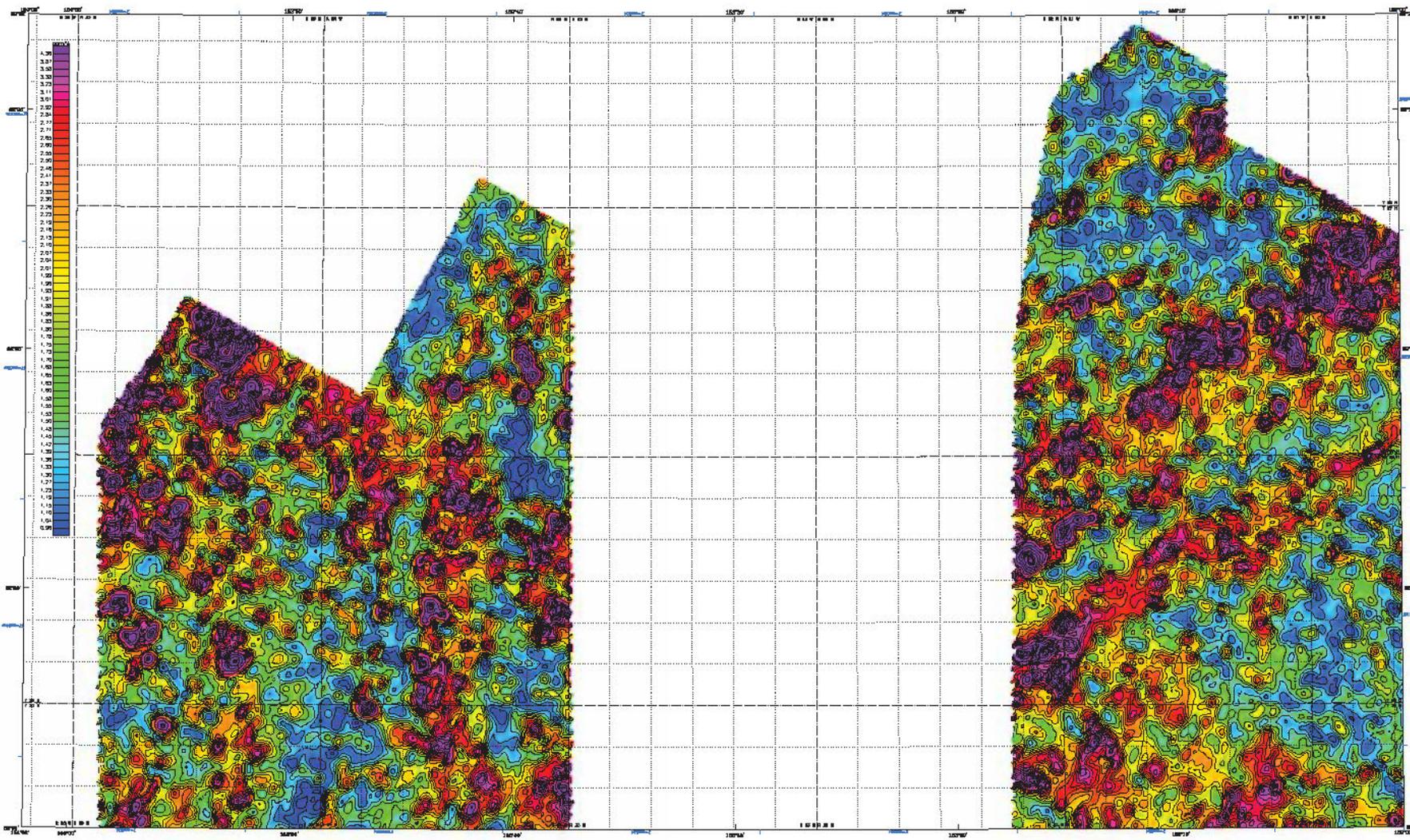
URANIUM / POTASSIUM (eU/K)

Measured radionuclide concentrations for uranium and potassium will vary systematically with variations in soil lithology and moisture content. The ratio parameter indicates areas of enrichment or area of depletion relative to another. A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

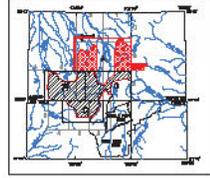
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIR) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3304 Collins 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.

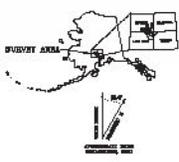


LOCATION PICH OF 1:62,500-SCALE MAPS



**URANIUM / POTASSIUM (eU / % K)
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Duran, CGS and Fugro GeoServices, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a GEOSIR Electromagnetic (EM) system, a Fugro Global magnetometer with a bottom 200 ocean sensor, and a Radiation Monitor (RM-200) gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorer EM-200 spectrometer. The EM and radiometric surveys were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition to the survey data, the Fugro Global EM data, radiometric data, and other geophysical data were collected during the survey. The data were processed and plotted using the GEOSIR software. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second count rate. A Radiation Monitor (RM-200) gamma-ray spectrometer was the primary instrument used. However, an Explorer EM-200 spectrometer was used for some flights. Data were collected with 1.0M (1000 counts/second) and 4.0M (4000 counts/second) detectors. After operation of the RM-200, the data were transferred to the Fugro Global EM-200 spectrometer. The data were then processed and plotted using the GEOSIR software. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet.

URANIUM / POTASSIUM (eU/K)

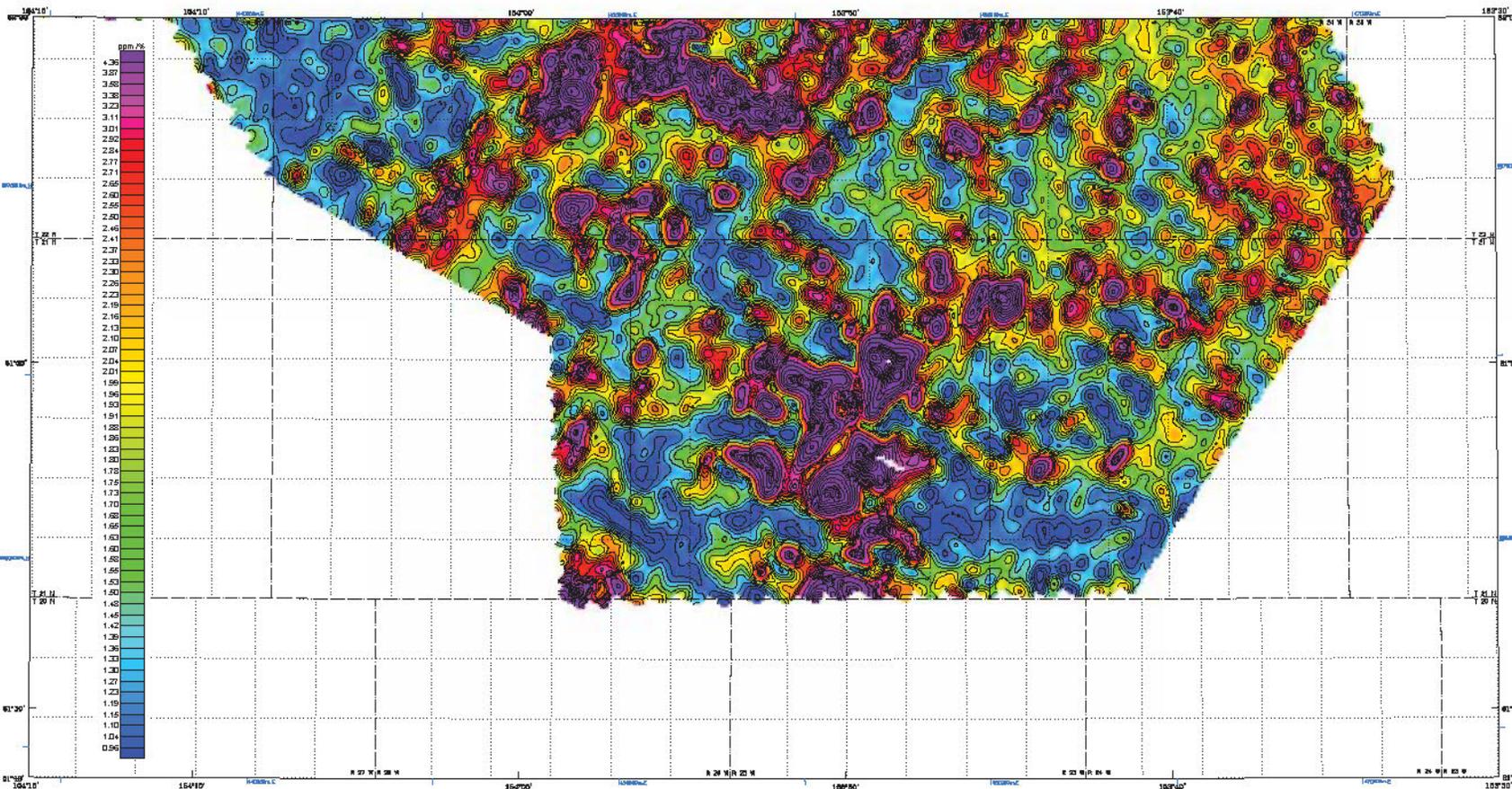
Measured radiometric concentrations for uranium and potassium are reported with contours in millibecquerels per gram (mBq/g). The radiometric data were processed and plotted using the GEOSIR software. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet.

SURVEY HISTORY

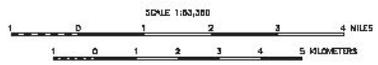
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGS in 2012, 2013, and 2014. The current survey was flown in the location of the Farewell Survey Area, and data were processed and plotted using the GEOSIR software. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet. The data were plotted on a grid with a spacing of 100 feet.

CONTOUR INTERVAL

.....	0.5 eU/K
.....	1.0 eU/K
.....	1.5 eU/K



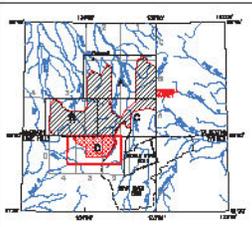
Geophysical Survey of the Farewell Survey Area, South-Central Alaska, 2014



URANIUM / POTASSIUM (eU / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition to the survey, radar data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of noise adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1860–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2615 keV) and cosmic radiation (3000–8000 keV). Counts from the radar detector were recorded in the radar window (1600–1800 keV). The noise detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size data to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1981. *Alaska Bureau of Geophysical Surveys, Technical Report 323, International Atomic Energy Agency, Vienna.*

URANIUM / POTASSIUM (eU/K)
Measured radionuclide concentrations for uranium and potassium will vary sympathetically with variations in soil thickness and moisture content. The ratio potassium/uranium indicates areas of enrichment of one radionuclide relative to another. A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

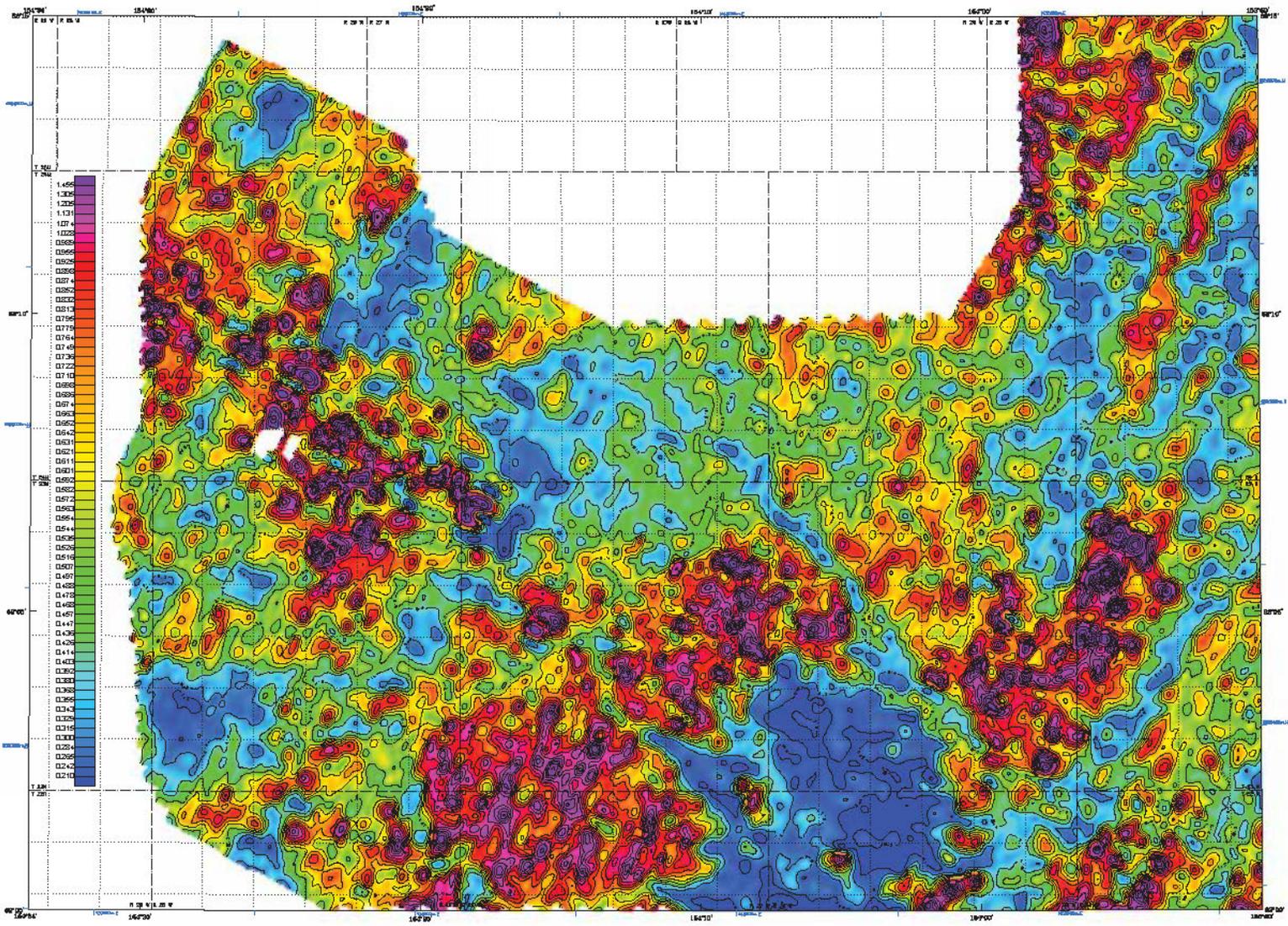
CONTOUR INTERVAL

.....	5.0 ppm/K
.....	1.0 ppm/K
.....	0.2 ppm/K

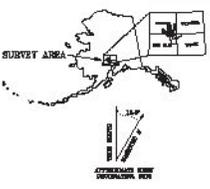
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. 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 project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3304 Collins 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.

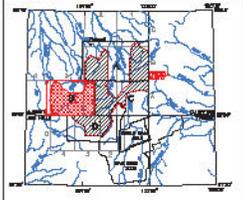


Scale bars: 0 to 4 Miles and 0 to 5 Kilometers. Location Index for 1:63,360-Scale Maps.



**URANIUM / THORIUM (eU / eTh)
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geosciences, Inc.
2014



DESCRIPTIVE NOTES

The geophysical data were acquired with a DORAD® Electromagnetic (EM) system, a Fugro D1 dual magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an Earthstar 25-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey reported data from radar and laser altimeter and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS350-B3 helicopter, helicopter of a mean barolo clearance of 2500 feet above MSL (1200' survey) from 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 OEMS-62L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1987 North American datum using a central meridian (CM) of 153° north-south, of 0 and an east constant of 600,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A radiation solution RS-300 gamma-ray spectrometer was the primary instrument used, however a Dabco 100-800 spectrometer was used for some flights. Both were configured with 1041 (1014 cubic inches) of NaI (crystal diameter, and 4.3 (358 cubic inches) of upward looking (rod) detector. After application of live/advance signal live discrimination to the spectra, counts from the main detector were recorded in five minutes corresponding to thorium (240-2810 keV), uranium (1800-1850 keV), potassium (1370-1570 keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-8000 keV). Counts from the rod detector were recorded in the main window (1660-1860 keV). The rod detector system was calibrated following methods outlined in IAG Report 353. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and dispersion from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in the package.

International Atomic Energy Agency, 1981. *Reference Gamma-Ray Spectrometry*. Technical Report 282. International Atomic Energy Agency, Vienna.

URANIUM / THORIUM (eU/eTh)

Measured radiometric concentrations for uranium and thorium will vary systematically with variations in soil thickness and moisture content. The ratio parameter isolates areas of enrichment or one radiometer relative to another.

A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

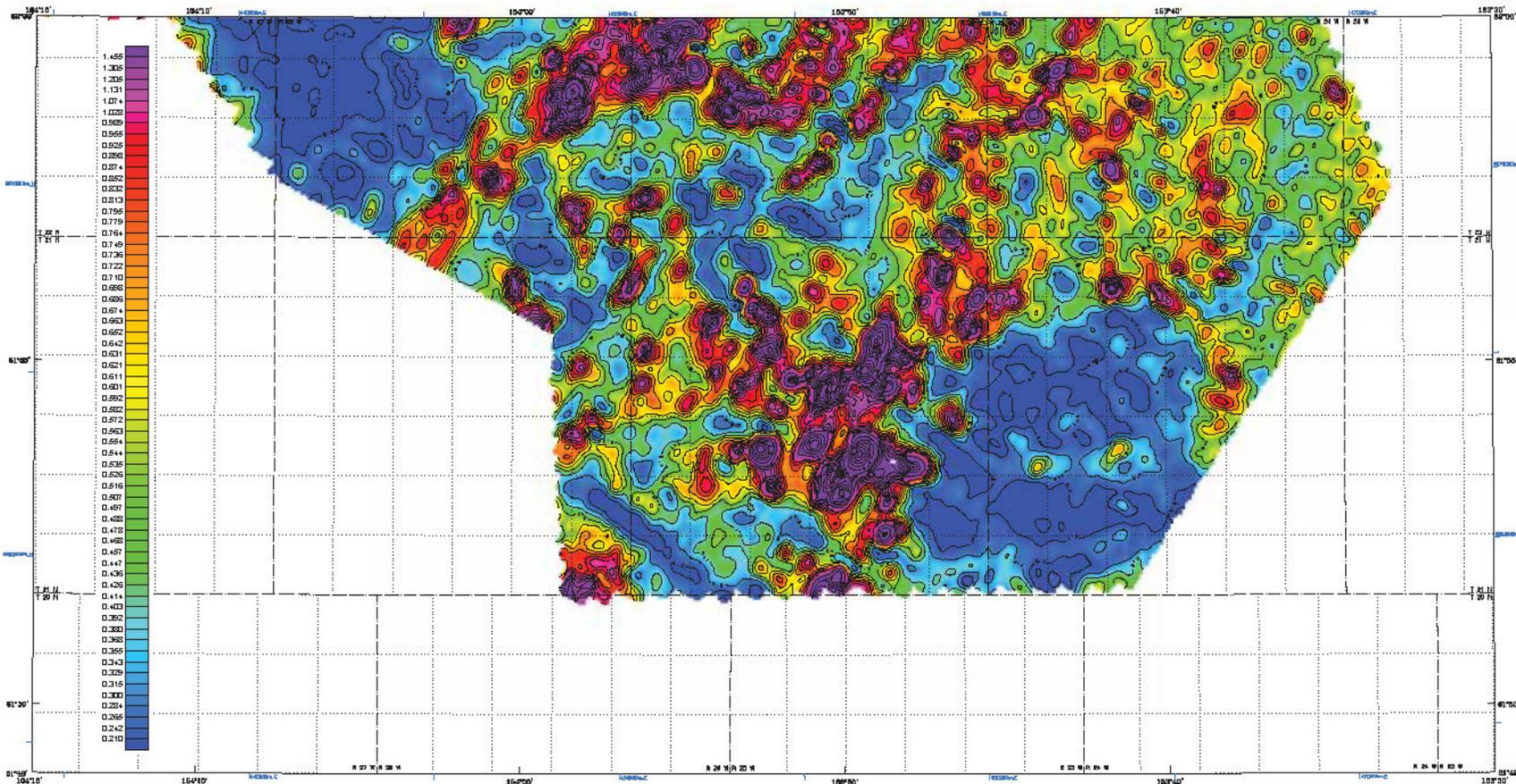
CONTOUR INTERVAL

.....	2.00
.....	4.00
.....	6.00

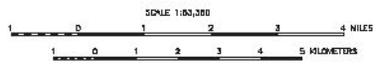
SURVEY HISTORY

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 Geosciences, Inc. Alaska geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys contribute to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Division of Geological & Geophysical Surveys Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

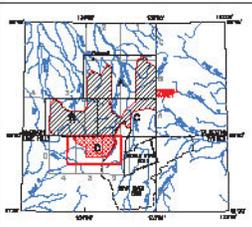
All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.



1:63,360 SCALE MAP OF GEOPHYSICAL SURVEY AREA 2014-2-19D
 Date: 02/19/14, 02/20/14, 02/21/14



LOCATION INDEX FOR 1:63,360-SCALE MAPS



URANIUM / THORIUM (eU / eTh) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz magnetometers, and video cameras. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of high (downward) low crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of noise adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (1600-1800 keV). The noise detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size data to a 25 m cell size to produce the maps and final grids contained in this publication.

Interpreted Aerial Energy Agency, 1981, Alaska Bureau of Geophysical Surveys, Technical Report 323, Interpreted Aerial Energy Agency, Yreka.

URANIUM / THORIUM (eU/eTh)

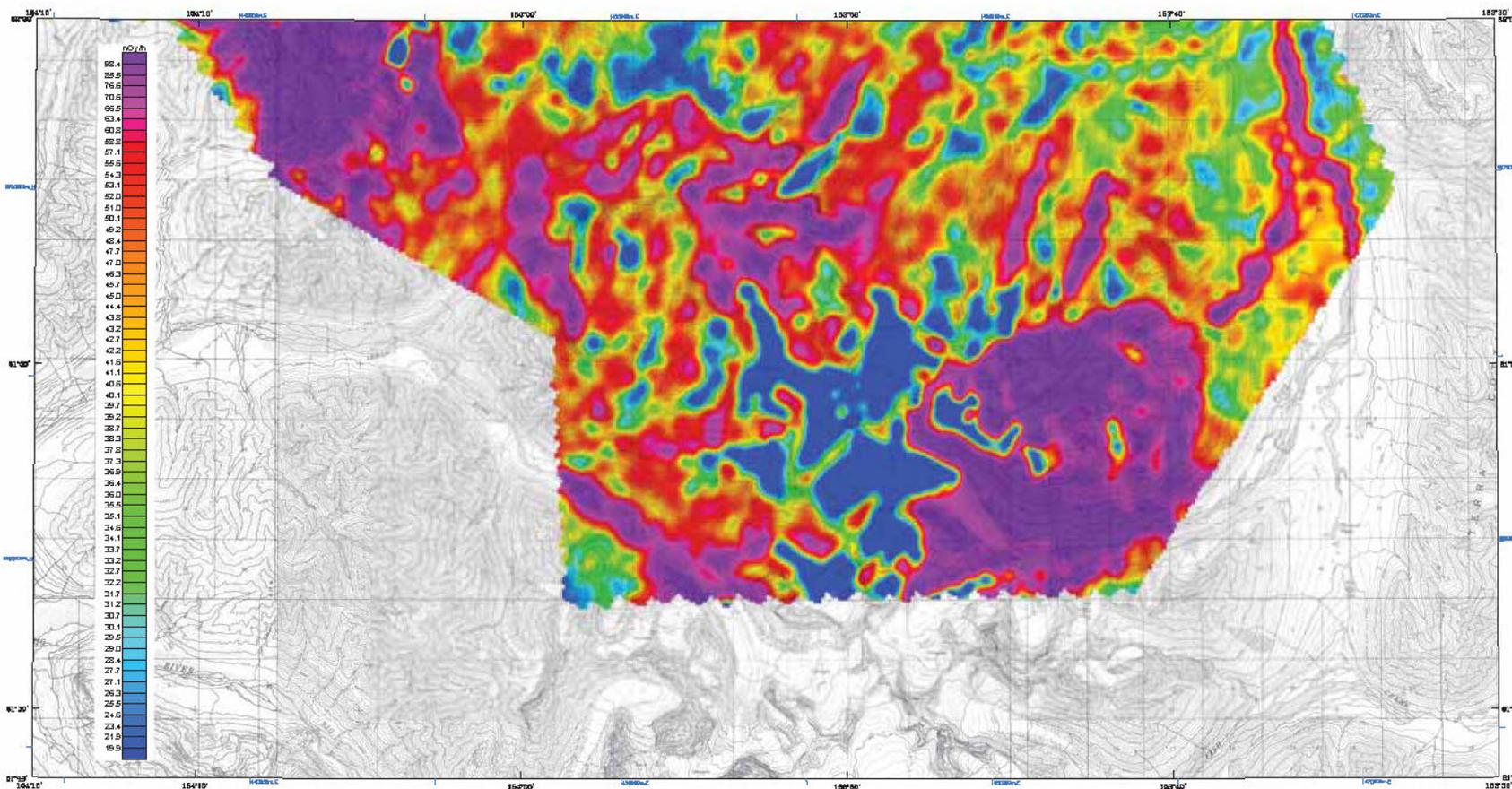
Measured concentrations for uranium and thorium will vary sympathetically with variations in soil thickness and moisture content. The ratio parameter indicates areas of enrichment of one radionuclide relative to another. A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

CONTOUR INTERVAL	Value
.....	2.50
.....	0.50
.....	0.10

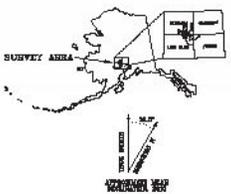
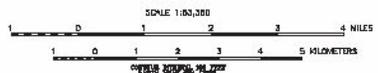
SURVEY HISTORY

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. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG 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 Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3364 Collins 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 effort, and are viewable online at the website in Adobe Acrobat PDF file format.



DATE: 2014-08-14 10:00:00 AM
 USER: J. BURNE
 PROJECT: 2014-2-26D
 SCALE: 1:63,360



NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burne, CGG, and Fugro GeoServices, Inc.
 2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitetsu CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-B20 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey received data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an S-350-B3 Squirrel tail-copter at a mean terrain clearance of 200 feet along 1200' 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.

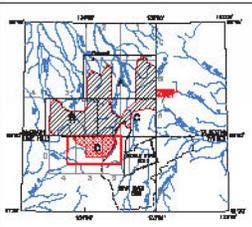
A Novatel OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 157°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-B20 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of high (downward) Bi crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of Hesse Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2415-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (3000->8000 keV). Counts from the radar detector were recorded in the radon window (1600-1800 keV). The radon detection system was calibrated following methods outlined in NEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size data to a 25 m cell size to produce the maps and final grids contained in this publication.

Intermittent Alaska Energy Agency, 1981. Alaska Bureau of Geophysical Surveys. Technical Report 323. Intermittent Alaska Energy Agency, Fairbanks.

LOCATION INDEX FOR 1:63,360-SCALE MAPS



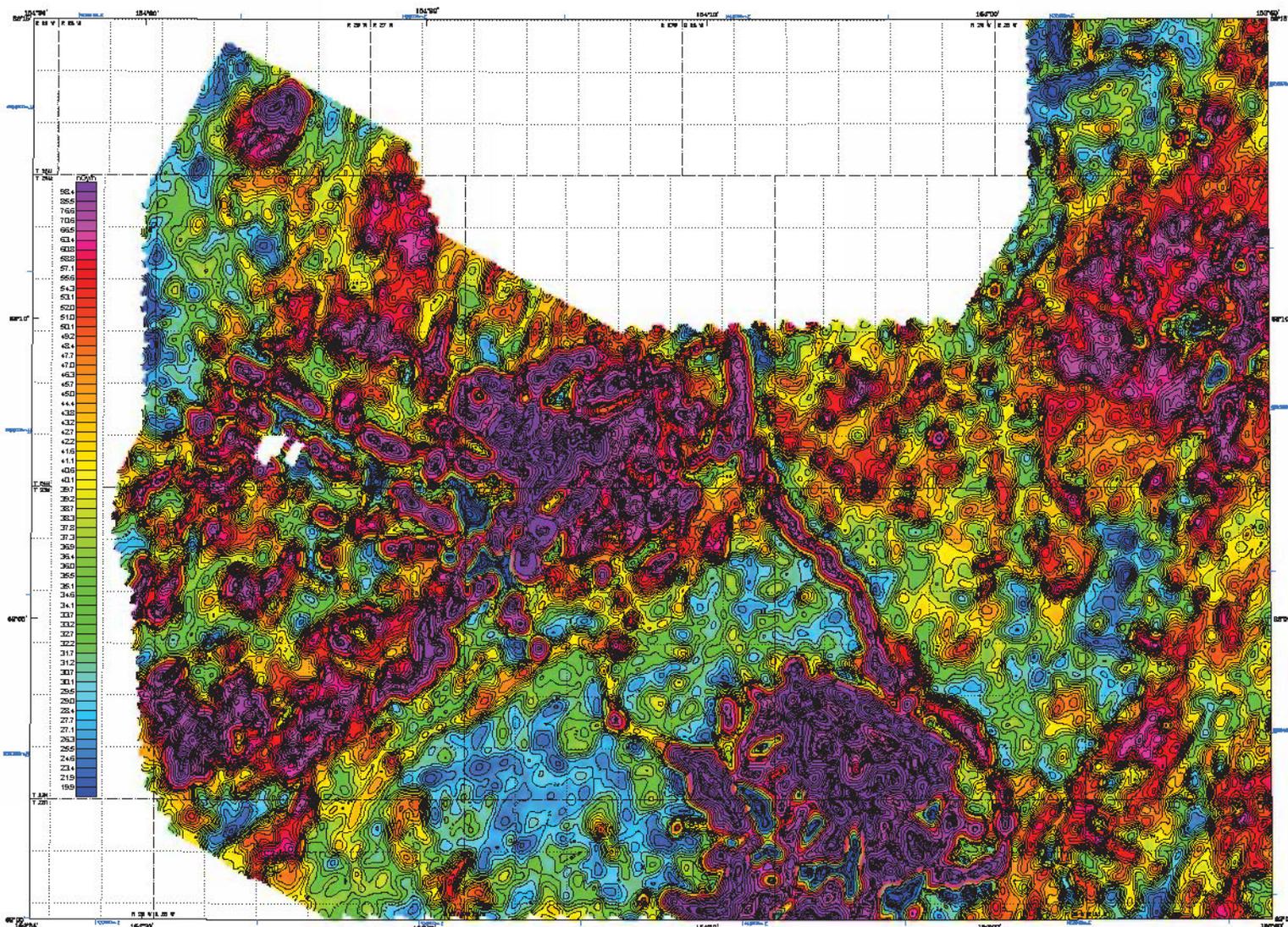
SURVEY HISTORY

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 DGGS in 2012, 2013, and 2014. 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 project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

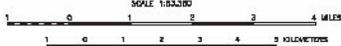
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3364 Collins Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

Raw counts have been converted to radiocesium concentrations, and combined to produce natural air-absorbed dose rate, so that the results are independent of crystal volume and planned survey height. This facilitates comparisons to other surveys and ground data. Measurements are nanograms per hour (nGy/h).

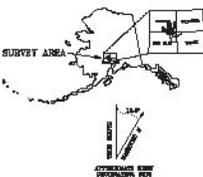
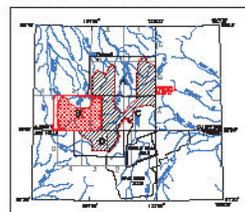
NATURAL AIR ABSORBED DOSE RATE



Latitude values from U.S. Geological Survey GCS 83-4, 83B, 3-4, 83C, 83D, 3-4, U.S. Geological Survey, Alaska.



LOCATION INDEX FOR 1:63,360-SCALE MAPS



**NATURAL AIR ABSORBED DOSE RATE (nGy/h)
WITH DATA CONTOURS,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES**

by
Lauri E. Burns, OGS, and Fugro Geosciences, Inc.
2014

DESCRIPTIVE NOTES

The geophysical data were acquired with a DEDERX Electronics (EM) system, a Fugro D1 base magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights utilized the radiometric data with an Earthstar 350-350 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an on-board 4000 ft. fuel-tanker at a mean barolo clearance of 2500 feet along 100-foot (100 ft) 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 OEMS-62L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1987 North American datum using a central meridian (CM) of 153° north-south, of 0 and an east constant of 600,000. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A radiation solution RS-300 gamma-ray spectrometer was the primary instrument used, however a Dabco RS-400 spectrometer was used for some flights both were configured with 1041 (1014 cubic inches) of high-purity germanium (HPGe) crystal detector and 4.3 (358 cubic inches) of liquid sodium iodide (NaI) detector. After application of live-adjustable bipolar bias decomposition to the spectra, counts from the main detector were recorded in five minutes corresponding to thorium (2410-2810 keV), uranium (1890-1990 keV), potassium (1370-1570 keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-5000 keV). Counts from the NaI detector were recorded in the main window (1660-1960 keV), the NaI detector system was calibrated following methods outlined in IAG Report 333. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and dispersion from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in the package.

International Atomic Energy Agency, 1991. Airborne Gamma Ray Spectrometry. Technical Report 252. International Atomic Energy Agency, Vienna.

SURVEY HISTORY

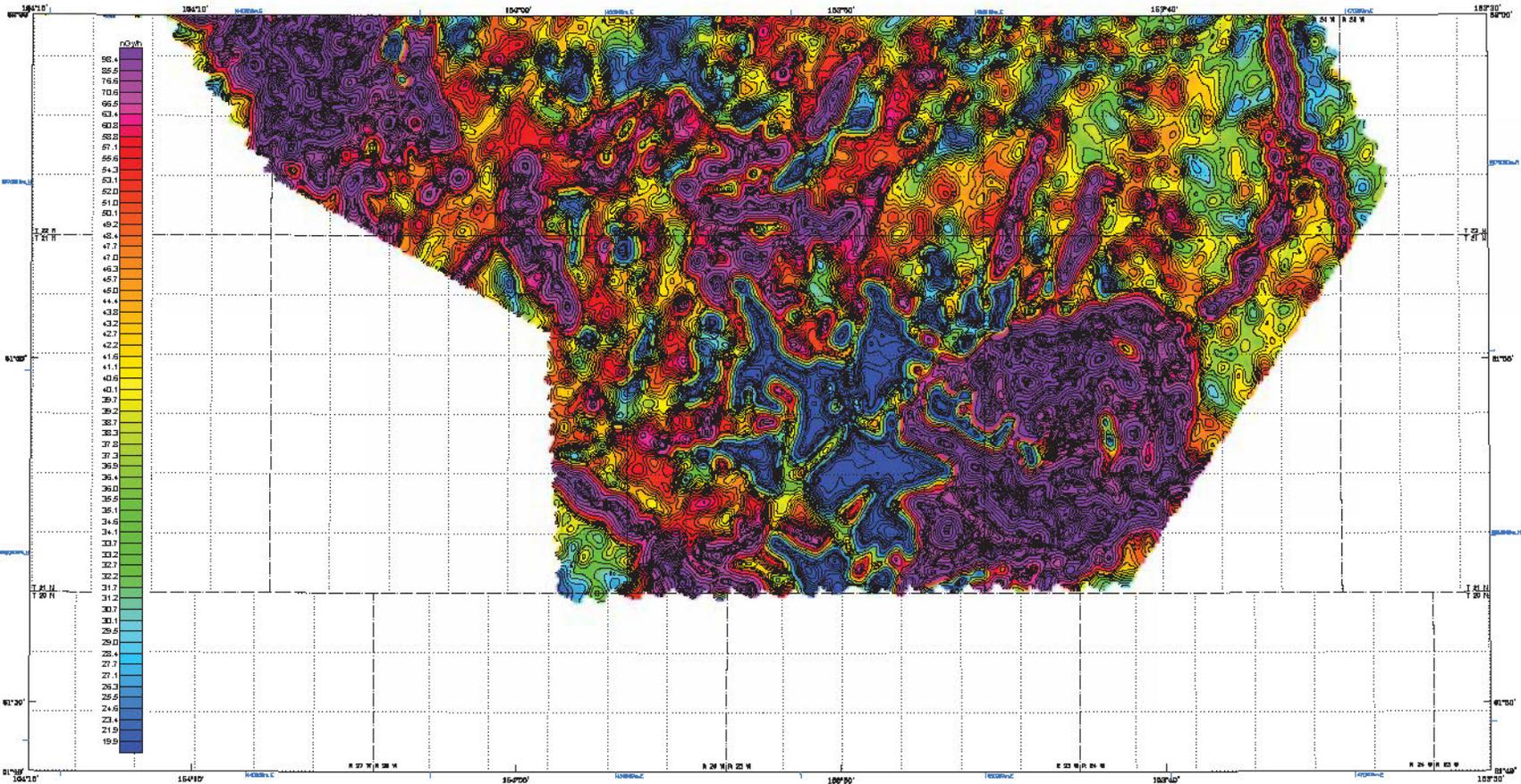
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro Geosciences, Inc. Alaska geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map for dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, 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 available online at the website in Adobe Acrobat PDF file format.

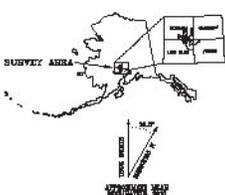
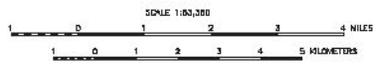
NATURAL AIR ABSORBED DOSE RATE

Raw counts have been converted to radiocesium concentrations, and combined to produce natural air absorbed dose rate, so that the results are independent of crystal volume and planned survey heights. This radiocesium concentrations to other surveys and ground data. Measurements are nanorays per hour (nR/h).

CONTOUR INTERVAL	
.....	100 nR/h
.....	10 nR/h
.....	2 nR/h



1:63,360 SCALE MAP OF THE FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA
 Date: 11/14/14

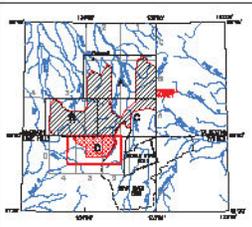


NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitron CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition to the survey radiometric data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an A-350/83 Squirrel helicopter at a mean terrain clearance of 200 feet along 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of noise adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (3000-8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The noise detection system was calibrated following methods outlined in WEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1981. *Alaska Bureau of Geophysical Surveys, Technical Report 323*. International Atomic Energy Agency, Vienna.

NATURAL AIR ABSORBED DOSE RATE

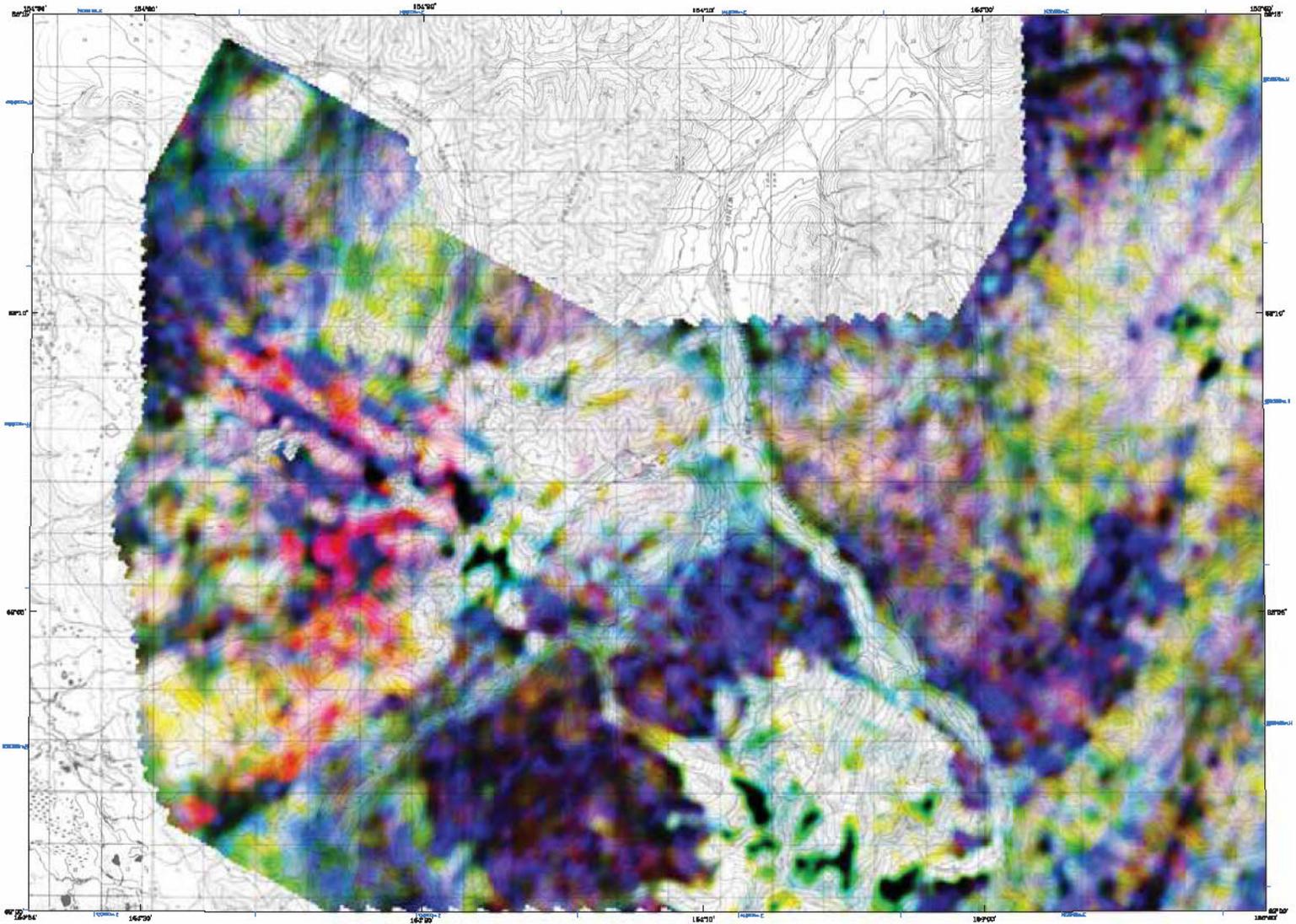
Raw counts have been converted to radioluminescence concentrations, and combined to produce natural air absorbed dose rate, so that the results are independent of crystal volume and planned survey height. This facilitates comparison to other surveys and ground data. Measurements are nonavg per hour (nGy/h).

CONTOUR INTERVAL

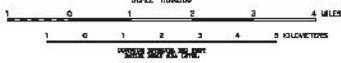
.....	100 nGy/h
.....	10 nGy/h
.....	2 nGy/h

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 DGGS in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Global Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3364 Collins 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.



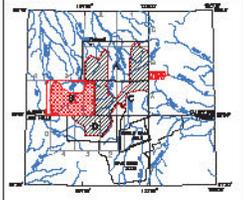
See also US Geological Survey sheets A-4, 189, A-4, 189, and A-4, 189, for topographic data.



**RADIOELEMENT - TERNARY
WITH TOPOGRAPHY,
FAREWELL SURVEY AREA,
SOUTH-CENTRAL ALASKA**
PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Lauri E. Burns, OGS, and Fugro Geosciences, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



DESCRIPTIVE NOTES

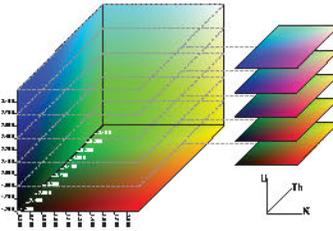
The geophysical data were acquired with a DISHBY Electronics (EVI) system, a Fugro D1-300 magnetometer with a Scripps 350 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. Some flights acquired the radiometric data with an ESR-300 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 300 feet. In addition the survey recorded data from radar and laser altimeters and navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350B3 helicopter, well-septor of a mean level clearance of 2500 feet along 100-50 (1:250) 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 OEM-82L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 3 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152° 0' north-south, of 0 and an east constant of 600,000. Fractional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-300 gamma-ray spectrometer was the primary instrument used, however a Dabco DR-400 spectrometer was used for some flights. Both were configured with 1041 (100% cubic inches) of high-purity Ge crystal detector, and 4.3 (358 cubic inches) of upward looking (rod) detector. After application of live/advance signal live discrimination to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (240-2810 keV), uranium (1800-1950 keV), potassium (1370-1570 keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-5000 keV). Counts from the rod detector were recorded in the main window (1660-1960 keV). The rod detector system was calibrated following methods outlined in IAG Report 333. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and dispersion from the planned survey elevation of 300 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in the package.

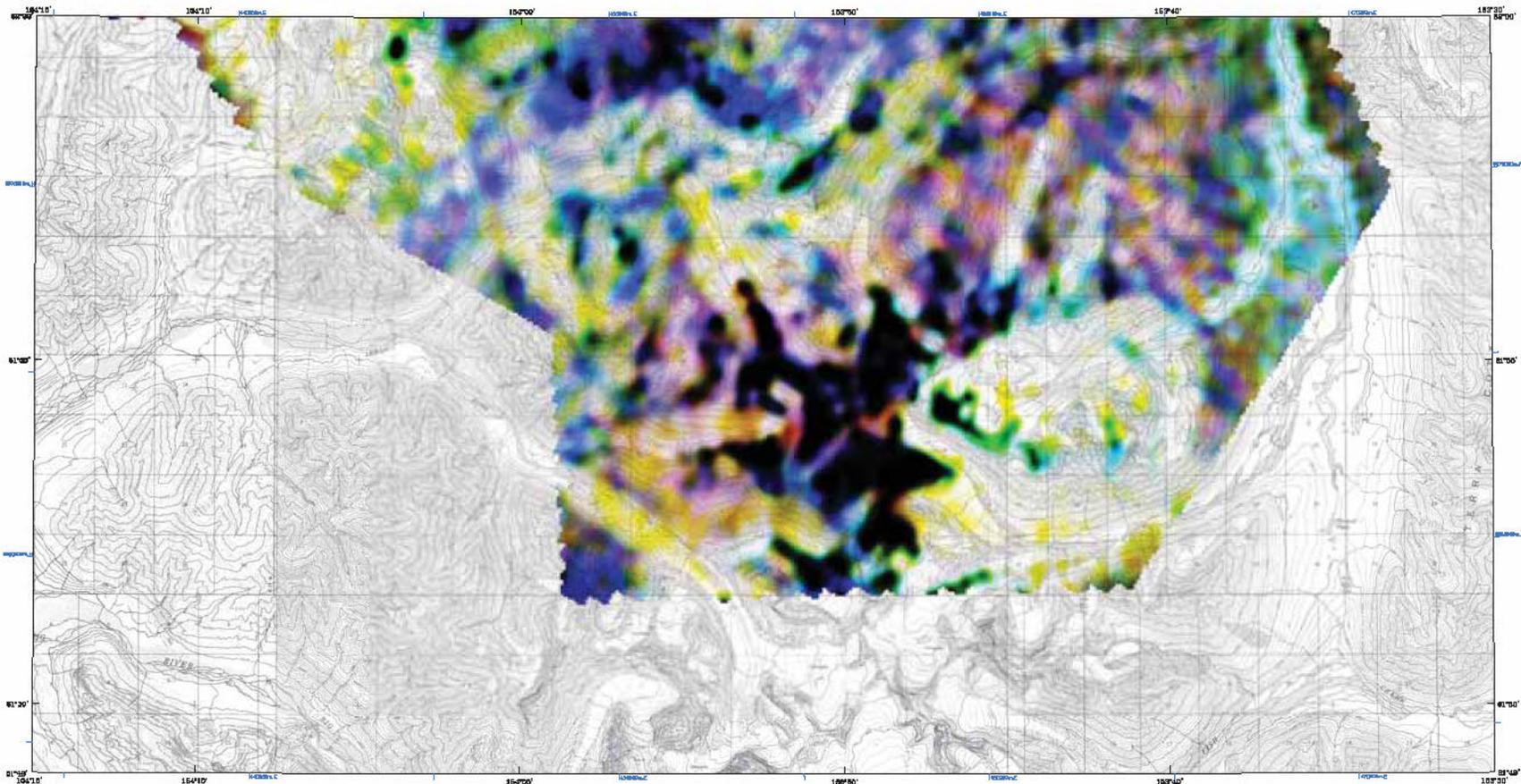
International Atomic Energy Agency, 1981. *Reference Gamma-Ray Spectrometry*. Technical Report 282. International Atomic Energy Agency, Vienna.



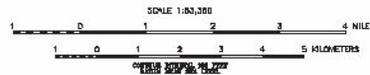
SURVEY HISTORY

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 Geosciences, Inc. Alaska geophysical data for the area were acquired and processed by DGGGS in 2012, 2013, and 2014. Fugro's former DGGGS surveying contractor to the current survey are shown in the location map by dashed lines, survey notes, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Minerals Geological and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced by data from this survey are available in digital format on DVD for a nominal fee through DGGGS, 1354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat .PDF file format.



DATE: 2014-08-28, TIME: 10:00 AM, PROJ: P-8, DATA: P-8, UTM
 Easting: 154700, Northing: 61200



DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEMY Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Saitrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Explorerium GR-820 spectrometer. The EM and radiometric sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/80 Hz monitors and video cameras. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (130°) 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 OEMD-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an oak constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Explorerium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of NaI (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radar) detector. After application of Naive Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2415-2810 keV), uranium (1860-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2615 keV) and cosmic radiation (2000->8000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detection system was calibrated following methods outlined in WEA Report 322. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

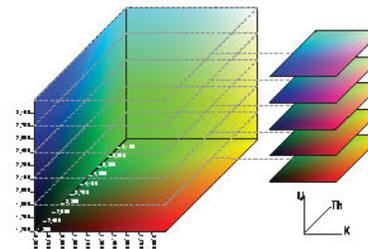
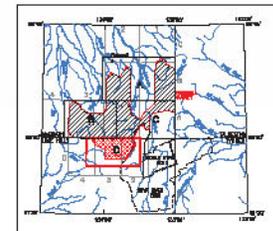
Intermittent Alaska Energy Agency, 1981. Alaska Bureau of Geochronology Surveying. Technical Report 322. Intermittent Alaska Energy Agency, Fairbanks.

RADIOELEMENT - TERNARY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
 Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
 2014

LOCATION INDEX FOR 1:63,560-SCALE MAPS



SURVEY HISTORY

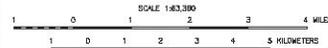
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGG in 2012, 2013, and 2014. Previously flown DGGG surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Fiscal Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGG, 3304 Dillinga Road, Fairbanks, Alaska, 99703-3707, 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.

**INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA**

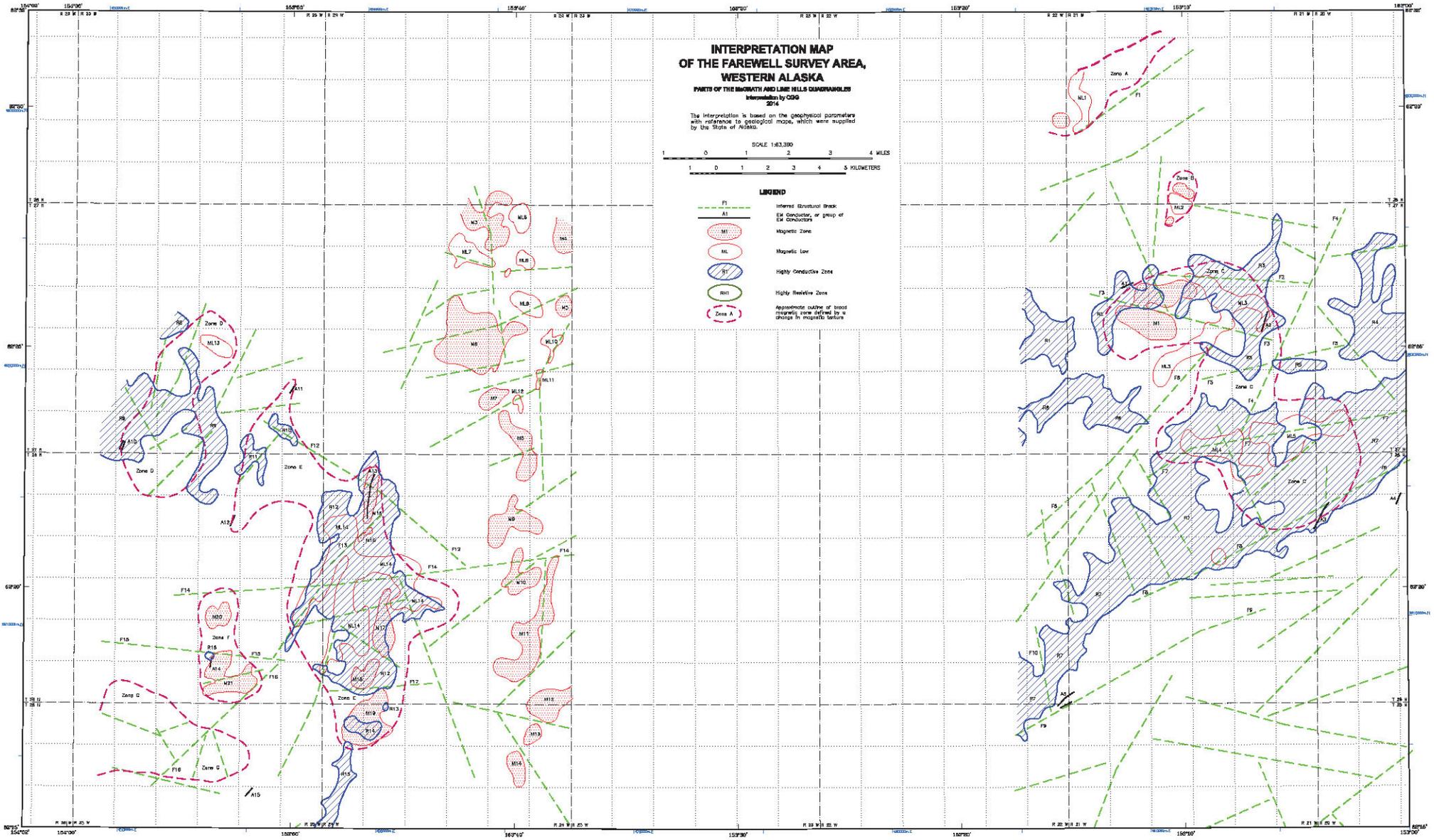
PARTS OF THE MCKENNA AND LINE HILLS QUADRANGLES
Interpreted by ODG
2014

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



LEGEND

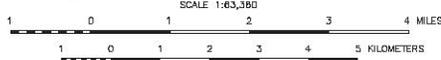
- F1 Inferred Structural Break
- A1 In conductor or group of E1 conductors
- M1 Magnetic Zone
- ML Magnetic Low
- F2 Highly Conductive Zone
- H1 Highly Resistive Zone
- Zone A Approximate outline of broad magnetic zone defined by a change in magnetic texture



**INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA**

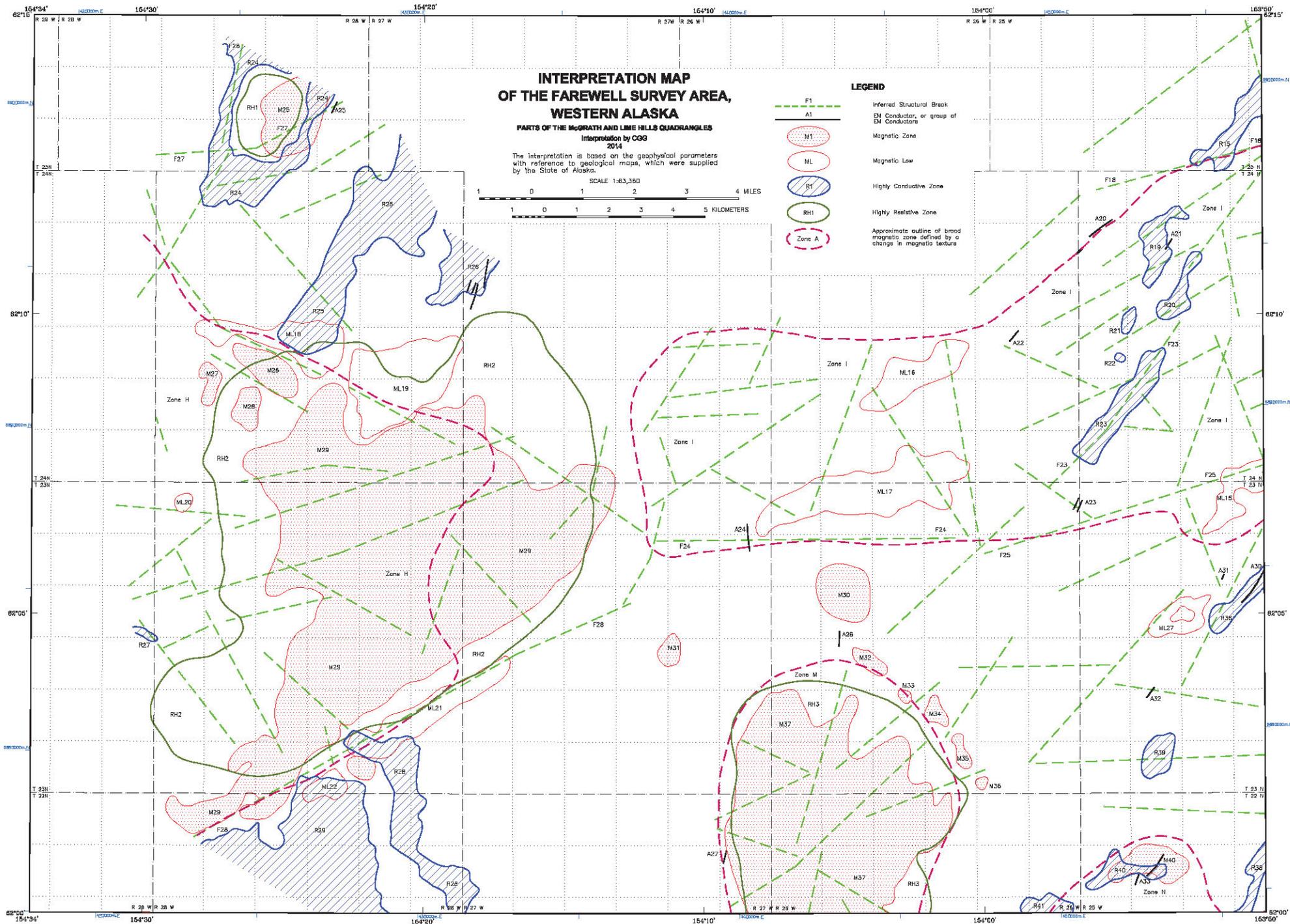
PARTS OF THE MCGRATH AND LIMB HILLS QUADRANGLES
Interpretation by CGG
2014

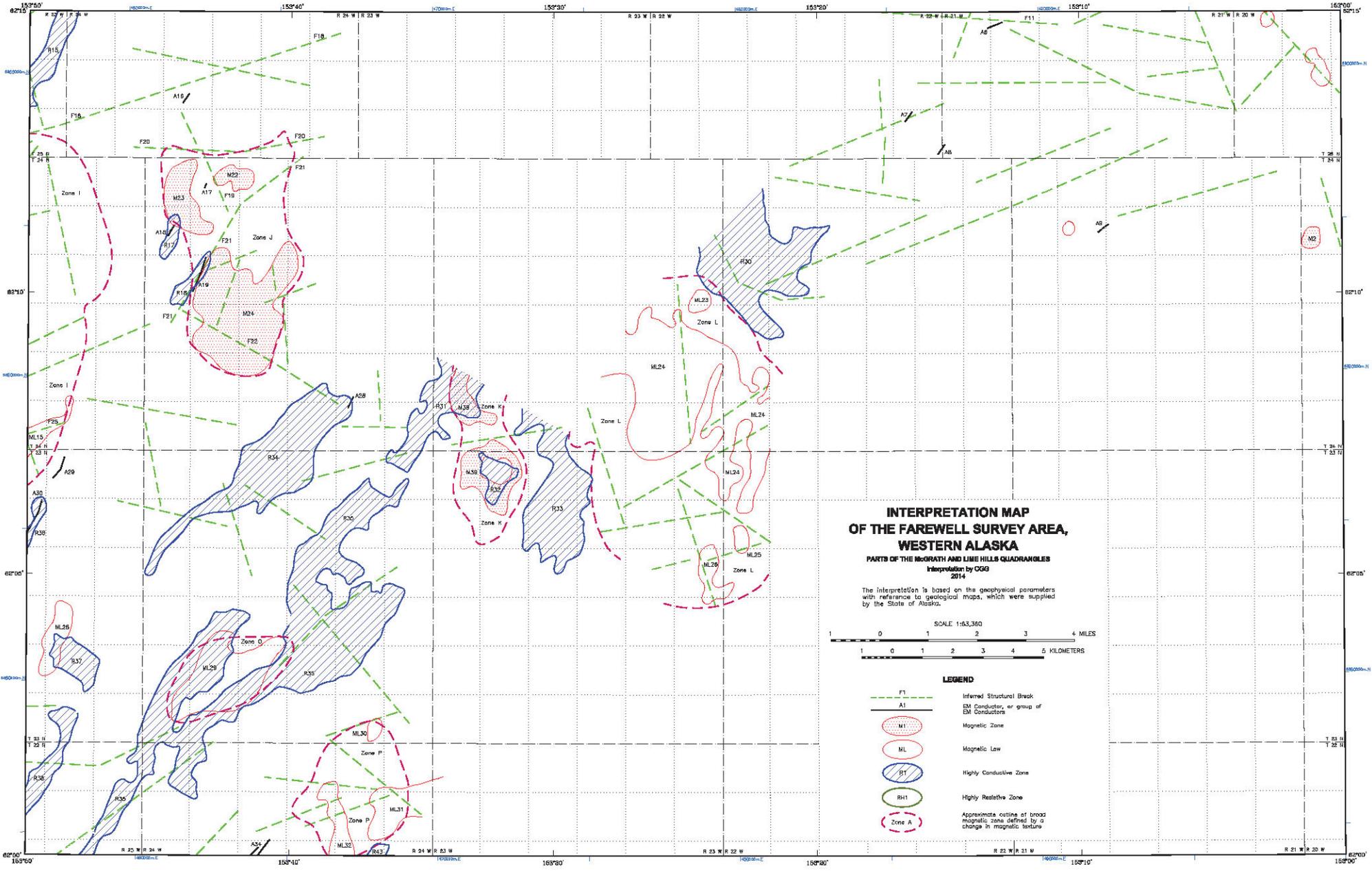
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.



LEGEND

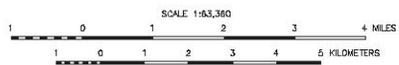
- F1 Inferred Structural Break
 - A1 EM Conductor, or group of EM Conductors
 - M1 Magnetic Zone
 - ML Magnetic Low
 - R1 Highly Conductive Zone
 - RH1 Highly Relative Zone
 - Zone A
 - Zone I
 - Zone M
 - Zone N
 - Zone H
- Approximate outline of broad magnetic zone defined by a change in magnetic texture





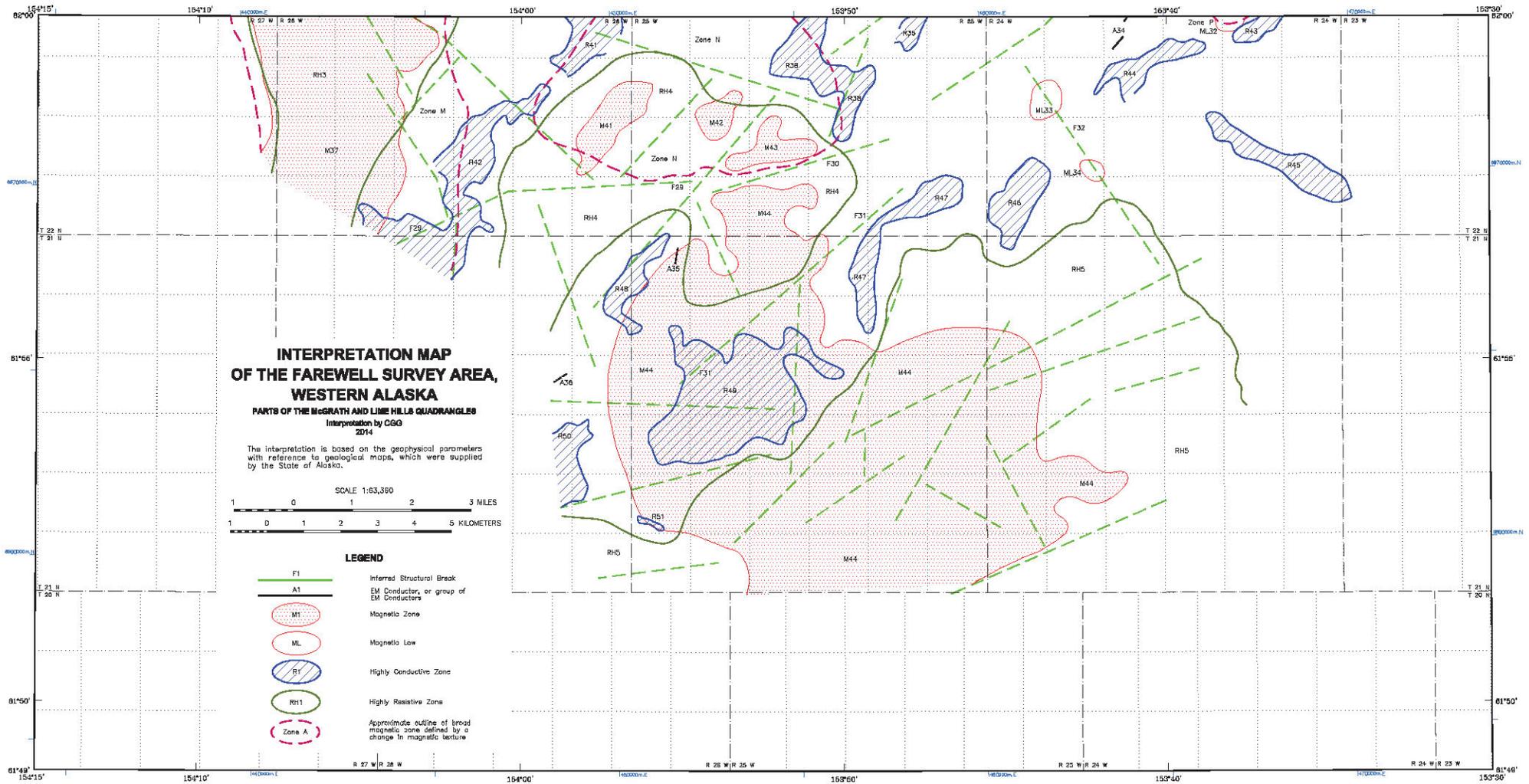
**INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA**
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
Interpretation by CGG
2014

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



LEGEND

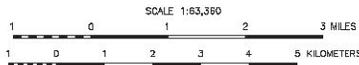
- F1 Inferred Structural Break
- A1 EM Conductor, or group of EM Conductors
- M1 Magnetic Zone
- ML Magnetic Low
- R1 Highly Conductive Zone
- RH1 Highly Resistive Zone
- Zone A Approximate outline of broad magnetic zone defined by a change in magnetic texture



**INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA**

PARTS OF THE McGRATH AND LIME HILA QUADRANGLES
Interpretation by CGG
2014

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

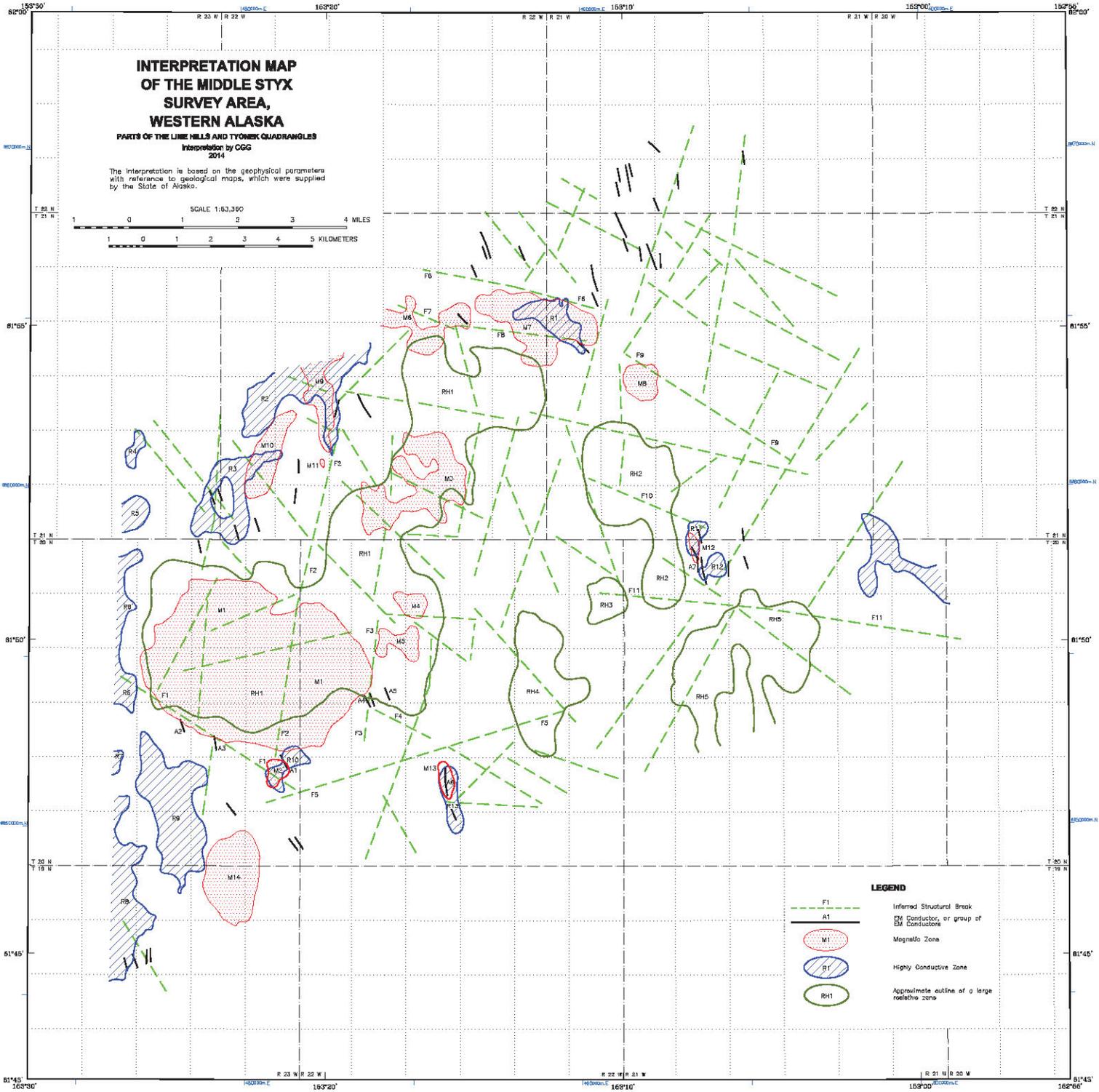
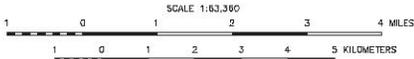


LEGEND

- F1 Inferred Structural Break
- A1 EM Conductor, or group of EM Conductors
- M1 Magnetic Zone
- ML Magnetic Low
- R1 Highly Conductive Zone
- RH1 Highly Resistive Zone
- Zone A Approximate outline of broad magnetic zone defined by a change in magnetic texture

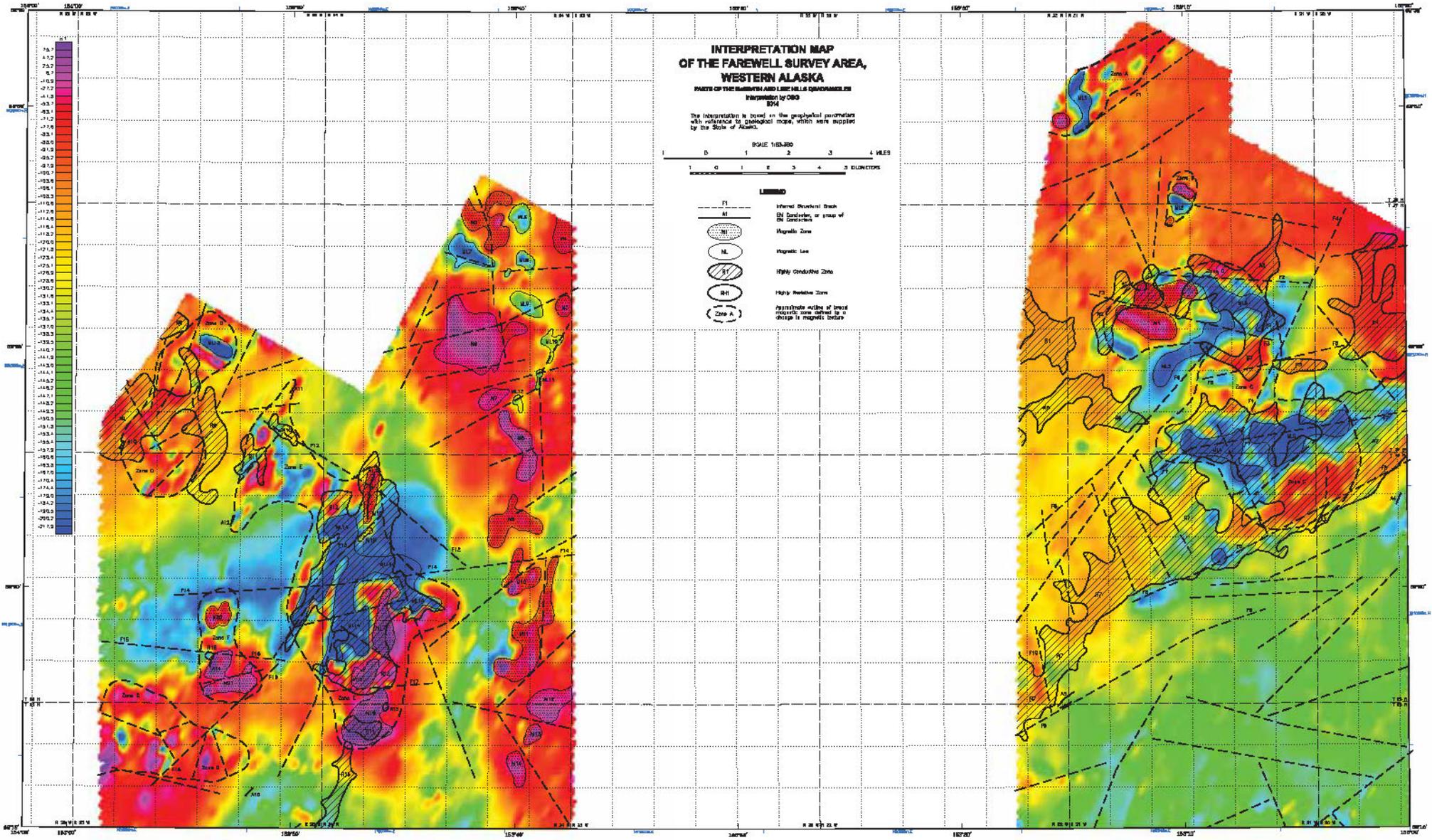
**INTERPRETATION MAP
OF THE MIDDLE STYX
SURVEY AREA,
WESTERN ALASKA**
PARTS OF THE LINE HILLS AND TYONEK QUADRANGLES
Interpretation by CGG
2014

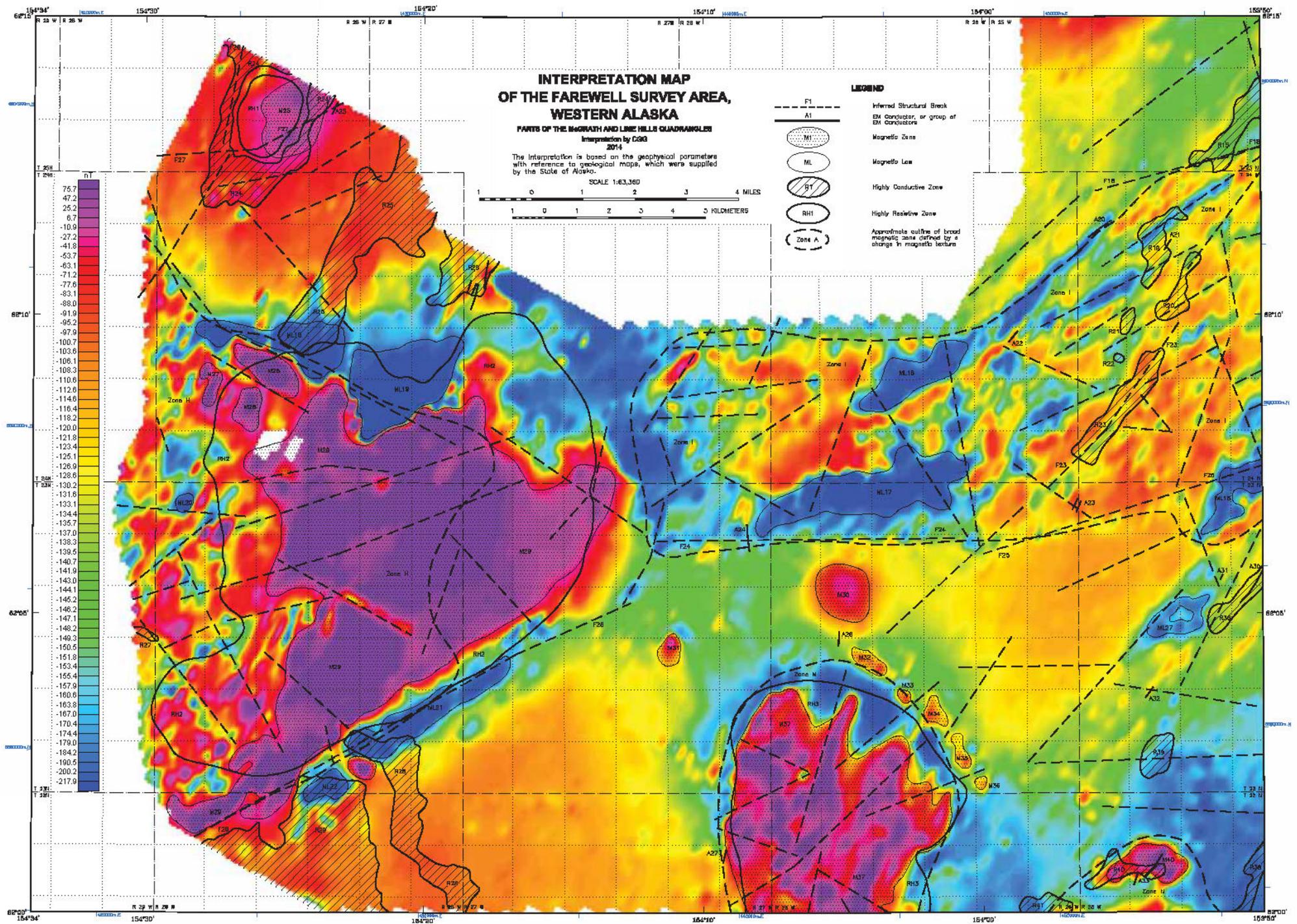
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.



LEGEND

- F1 Inferred Structural Break
- A1 EM Conductor, or group of EM Conductors
- M1 Magneto Zone
- R1 Highly Conductive Zone
- RH1 Approximate outline of a large relative zone



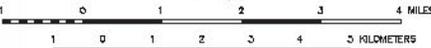


**INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA**

PARTS OF THE MAGNATH AND LIME HILLS QUADRANGLES
Interpretation by G290
2014

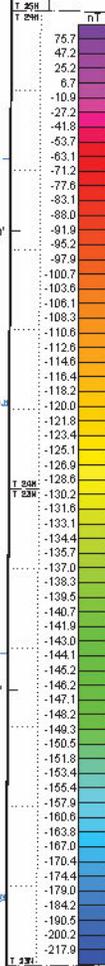
The interpretation is based on the geophysical parameters
with reference to geological maps, which were supplied by
the State of Alaska.

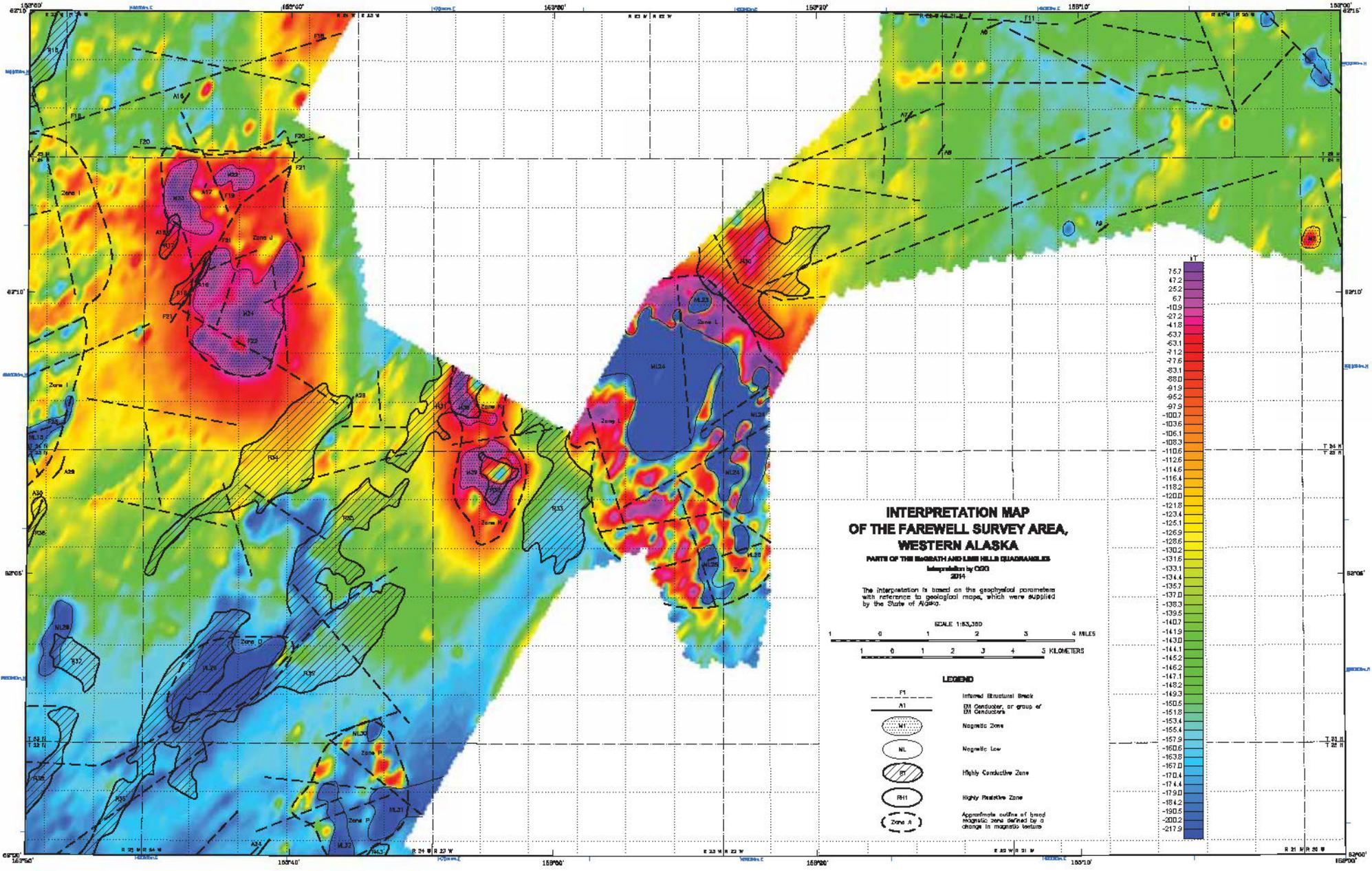
SCALE 1:63,360

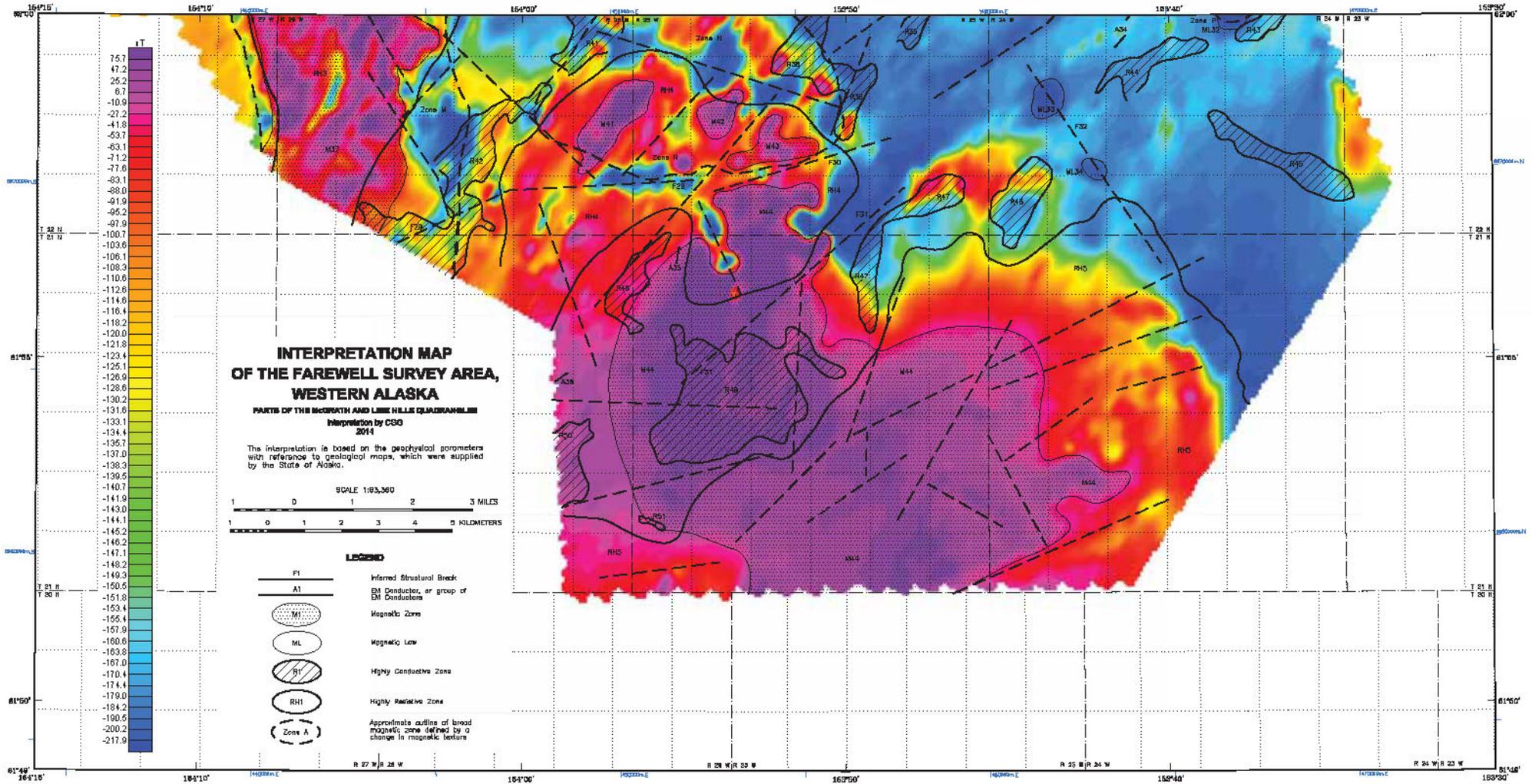


LEGEND

- F1
Inferred Structural Break
- A1
EM conductor, or group of EM conductors
- M1
Magnetic Zone
- ML
Magnetic Low
- R1
Highly Conductive Zone
- RH1
Highly Resistive Zone
- Zone A
Approximate outline of broad magnetic zone defined by a change in magnetic texture





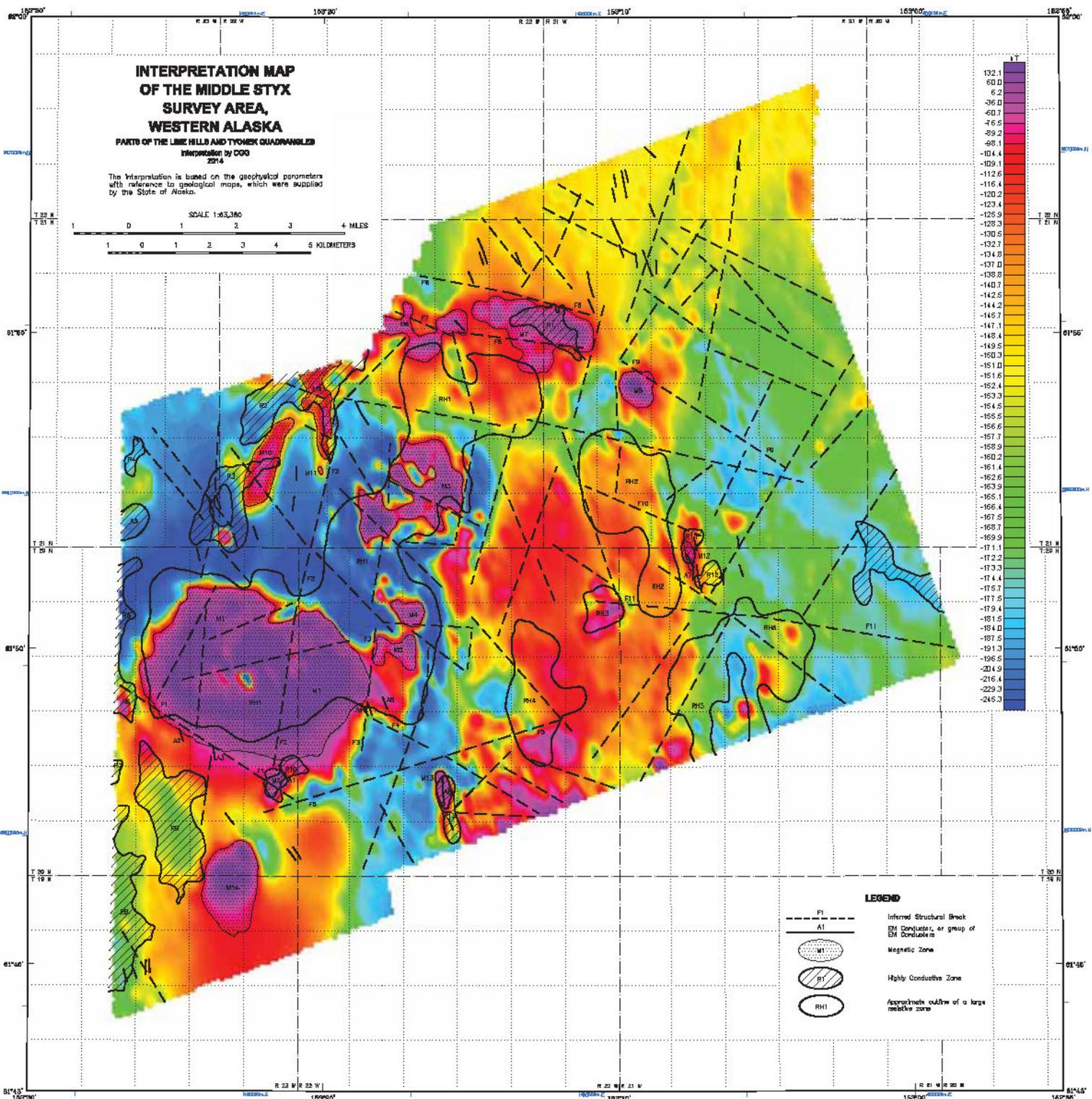
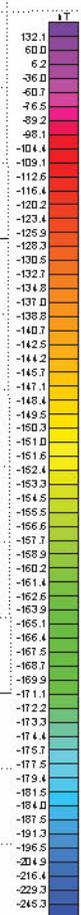
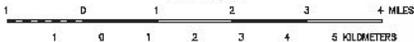


**INTERPRETATION MAP
OF THE MIDDLE STYX
SURVEY AREA,
WESTERN ALASKA**

PARTS OF THE LIME HILLS AND TYONER QUADRANGLES
Interpretation by DGG
2014

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
- M1 Magnetic Zone
- R1 Highly Conductive Zone
- RH1 Approximate outline of a large magnetic zone

