

**AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE LOWER YUKON DELTA,
ALASKA, DATA COMPILATION**

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Inc., and Aerodat Inc.

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AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE LOWER YUKON DELTA, ALASKA, DATA COMPILATION

Laurel E. Burns¹, Zonge Engineering Research Organization, Inc., and Aerodat Inc.

ABSTRACT

This airborne magnetic geophysical survey of the lower Yukon Delta, Alaska is in the St Michael, Kwiguk, and Black 1:250,000-scale USGS quadrangles on the Yukon River delta. Magnetic data were collected September 29 to November 20, 1995 by Aerodat. A total of 10,343.5 line kilometers were collected covering 7,402.9 square kilometers. Line spacing was 800 meters (m). Data were collected using a fixed wing aircraft with a median ground clearance of 90 m.

PURPOSE

These data were collected to improve the geologic understanding of the Yukon Delta and assist with determining the hydrocarbon potential of the area.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and derivative products of this survey. A table of digital data packages available for download is provided to assist users in data selection. For reference, a catalog of the available maps is presented in reduced resolution. Please consult the metadata, project report, and digital data packages for more information and data.

ACKNOWLEDGMENTS

Funding was provided by the Alaska State Legislature.

REFERENCES

- Alaska Division of Geological & Geophysical Surveys, Aerodat Inc., and Zonge Engineering Research Organization, Inc., 1996, Digital gridded data of total field magnetics of the Lower Yukon Delta: Alaska Division of Geological & Geophysical Surveys Public Data File 96-10, 1 DVD.
<http://doi.org/10.14509/1734>
- Burns, L.E., 2002, Total field magnetics of the lower Yukon Delta, Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2002-16, 1 sheet, scale 1:250,000.
<http://doi.org/10.14509/2883>
- Burns, L.E., Aerodat Inc., and Zonge Engineering Research Organization, Inc., 1996, Project report of a high resolution aeromagnetic survey of Lower Yukon Delta, Alaska, containing interpretation map: Alaska Division of Geological & Geophysical Surveys Public Data File 96-14, 104 p., 1 sheet, scale 1:125,000.
<http://doi.org/10.14509/1738>

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

———1996, Total field magnetics and flight path of the Lower Yukon Delta, Alaska: Alaska Division of Geological & Geophysical Surveys Public Data File 96-11, 2 sheets, scale 1:125,000.

<http://doi.org/10.14509/1735>

AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	DGGS	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	DGGS	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	DGGS	Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or the free viewer available from Geosoft
images_registered	DGGS	GeoTiff format images of all gridded data
kmz	DGGS	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	contractor and DGGS	Printable maps in pdf format. Includes a geographically registered pdf (GeoPDF) for use with mobile devices such as GPS enabled smartphones and tablets, other devices, and programs
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

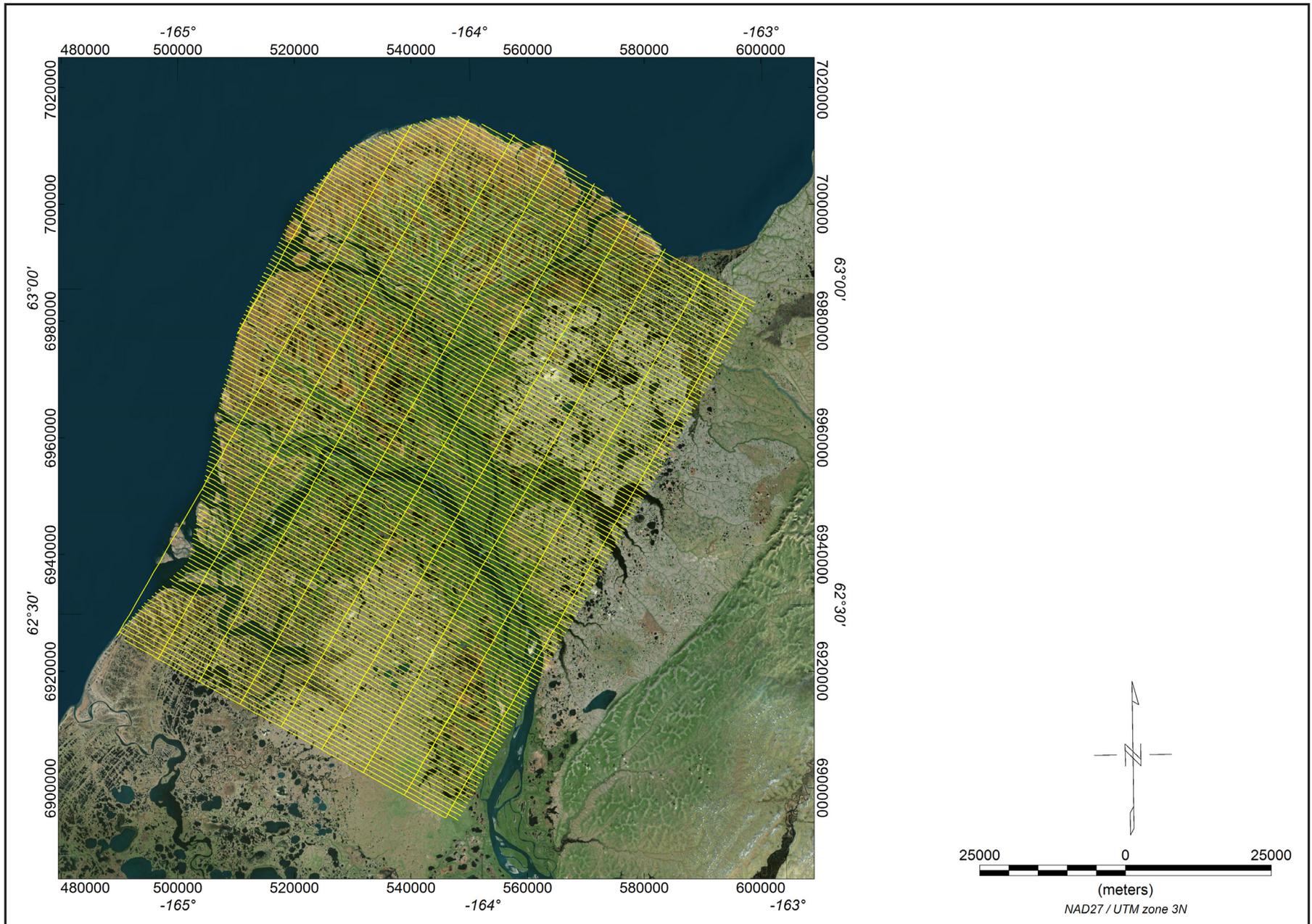


Figure 2. Flight path with orthometric image.

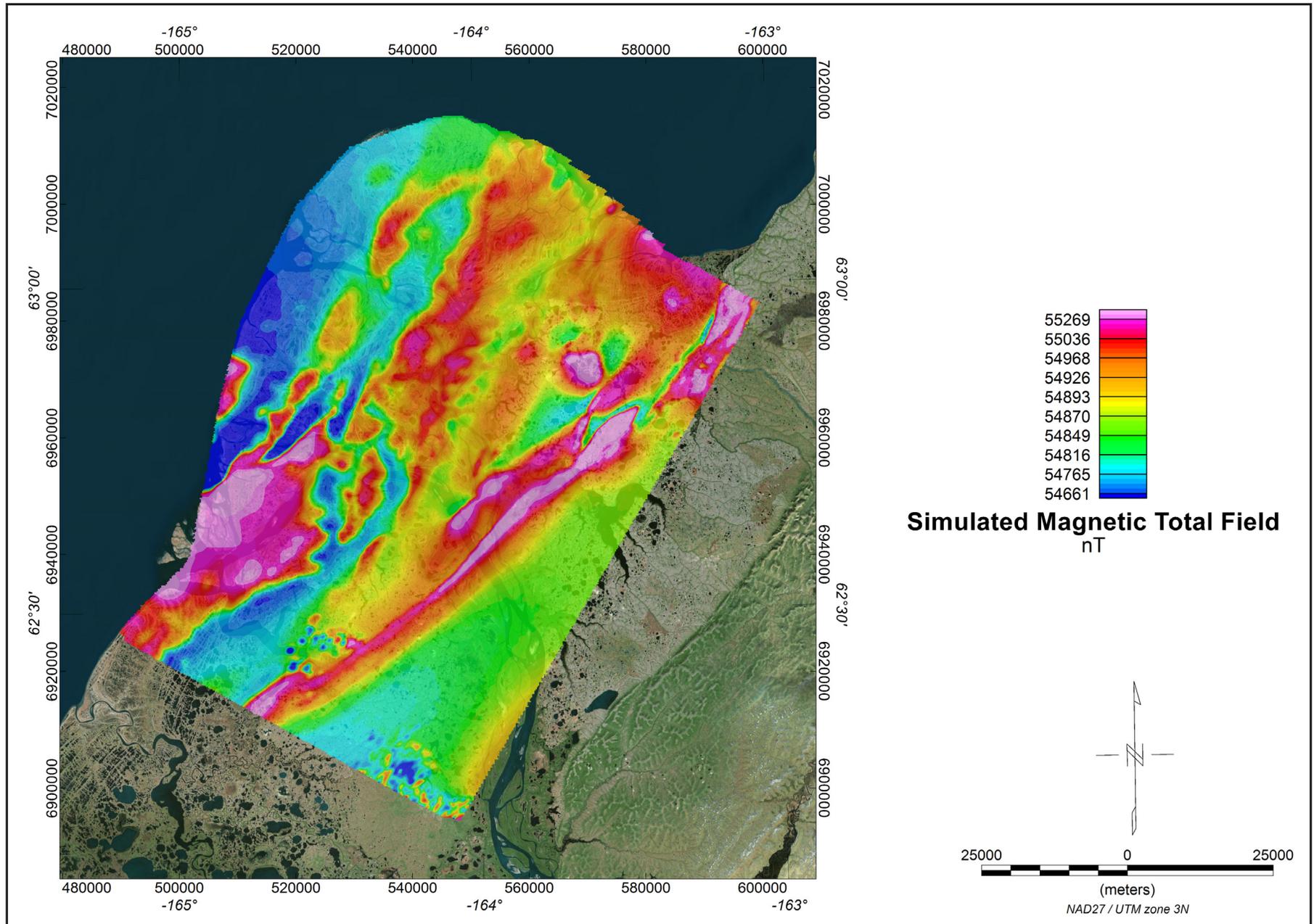


Figure 3. Simulated magnetic total field grid with orthometric image.

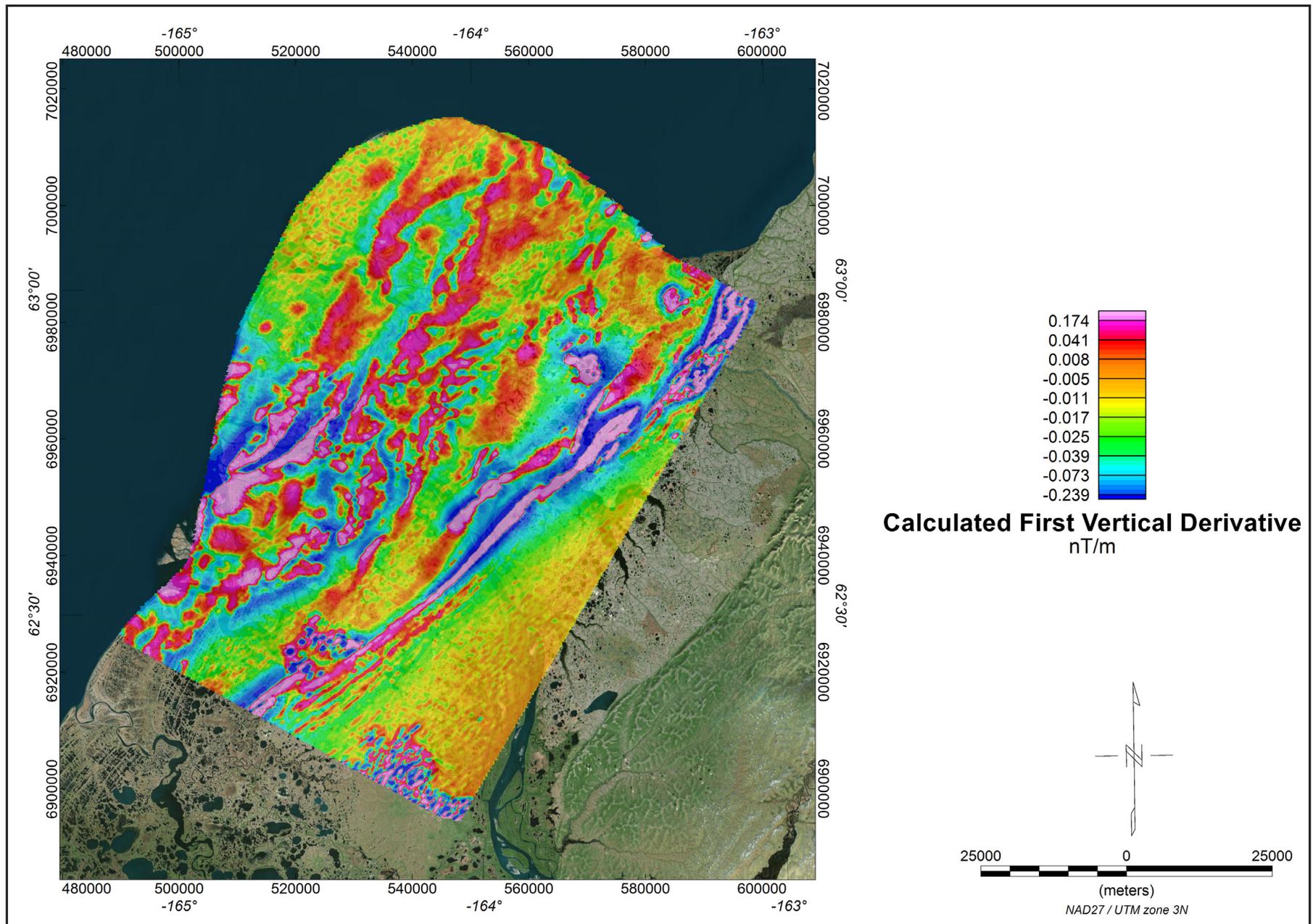


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

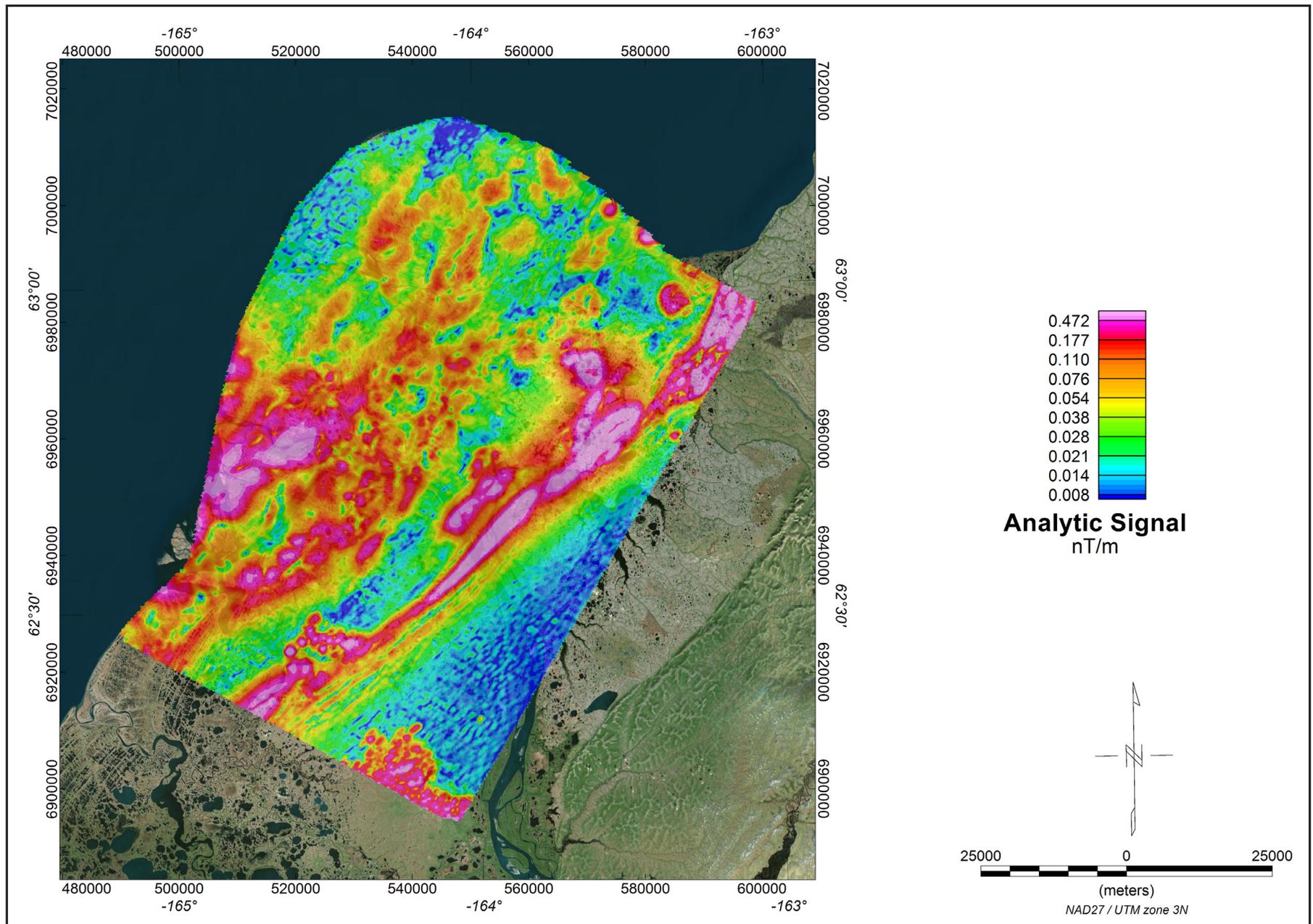


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.

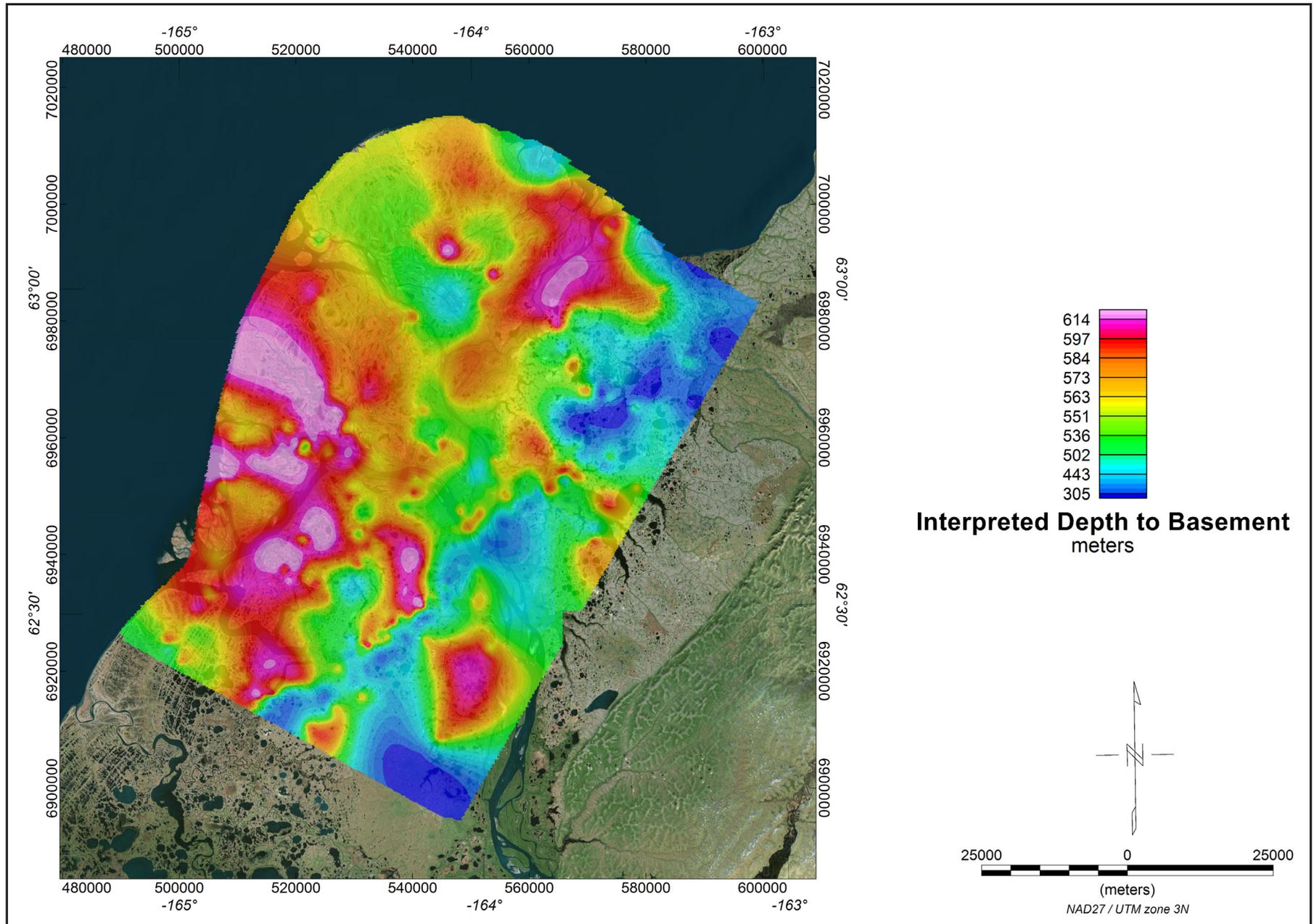
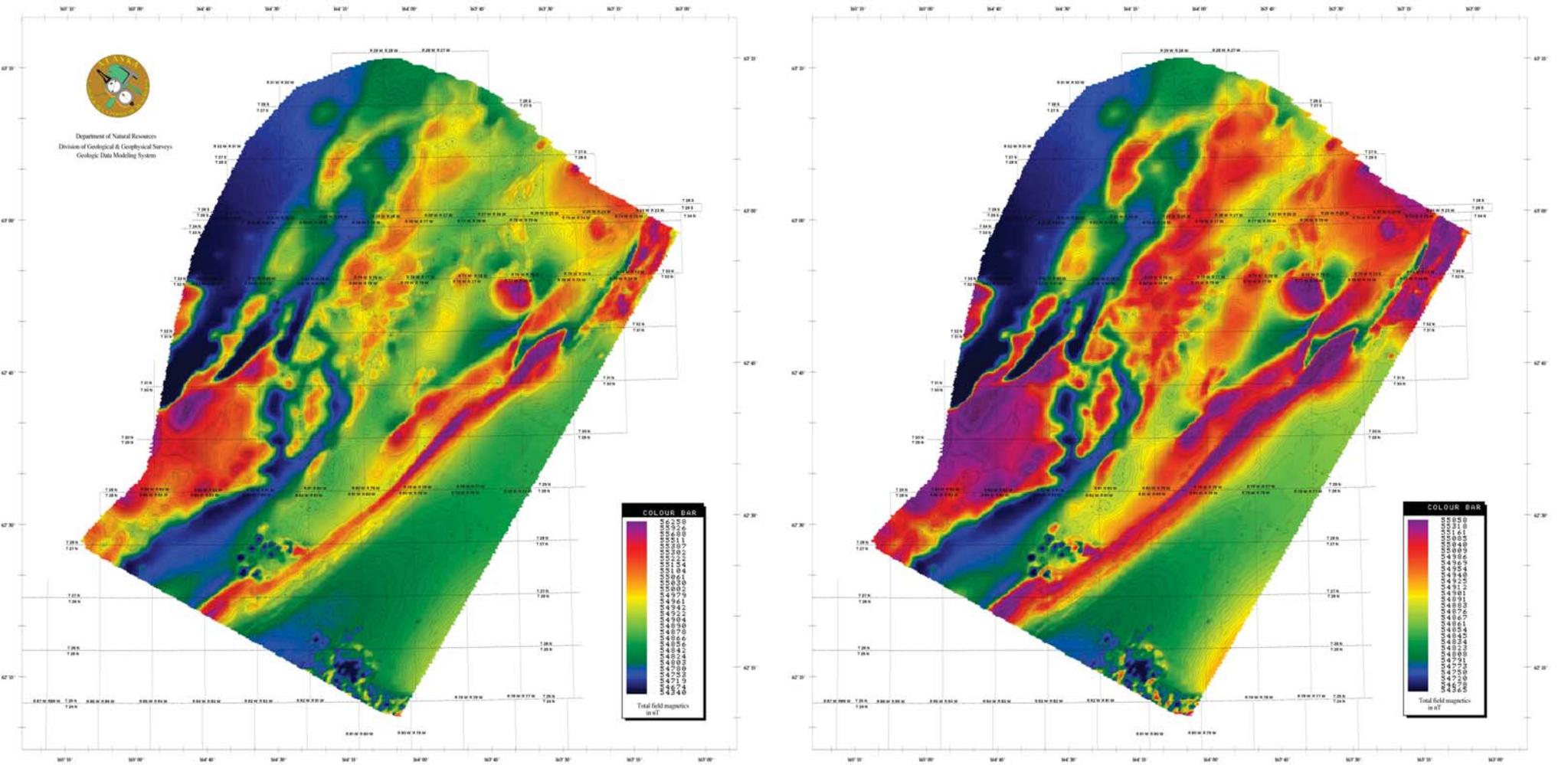


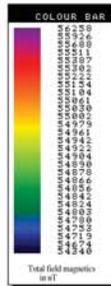
Figure 6. Interpreted depth to basement grid with orthometric image.

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/10.14509/30460>

Map Title	Description
lower_yukon_delta_sim_magtf_plss_map.pdf	simulated magnetic total field grid with Public Lands Survey System base layer
lower_yukon_delta_sim_magtf_topo_map_1of2.pdf	simulated magnetic total field contours with topographic base map
lower_yukon_delta_sim_magtf_topo_map_2of2.pdf	simulated magnetic total field contours with topographic base map
lower_yukon_delta_interpretation_map.pdf	interpretation of the magnetic data



Department of Natural Resources
Division of Geological & Geophysical Surveys
Geologic Data Modeling System



Section outlines from U.S. Geological Survey topographic base: Buck (1953), St. Michael (1952), and Rampart (1952), quadrangles, Alaska.

GAUSSIAN COLOR SCHEME



1990 magnetic declination varies along the south side of the map from approximately 10° 15' to 17° 30' east.



EQUAL AREA COLOR SCHEME



AVERAGE SENSOR ELEVATION:	300 FEET ABOVE TERRAIN
TRAVERSE INTERVAL:	0.5 mile
TRAIL LINE INTERVAL:	5.0 miles
CLARK 1866 PERIOD:	UTM PROJECTION ZONE 3
INCLINATION:	73° NORTH
CONTOUR INTERVAL:	5, 25, 100, 500-gt

TOTAL FIELD MAGNETICS
The magnetic total field contours were produced using digitally recorded data from a Scintrex HB cesium vapor magnetometer, with a sampling interval of 0.5 seconds. The magnetic data were (1) corrected for diurnal variations, (2) converted to the magnetic declination of the date, (3) leveled to the sea level datum, and (4) interpolated into a regular 200m grid.

DESCRIPTIVE NOTES
The aeromagnetic data were acquired using a Scintrex HB cesium vapor magnetometer with an IBM ASAC-8 automatic compressor installed in a 1990 Aircr Commander Rapidwing aircraft. In addition, the IBM Data II digital acquisition system recorded data from the GPS navigation/positioning system. 40 tie markers, color patterns, and both vector and barometric altimeters. Differential post processing of the GPS data resulted in a vertical positional accuracy of 10 meters or better.

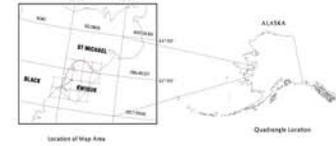
SURVEY HISTORY
The aeromagnetic survey was performed under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Zurich Engineering & Research Corporation. As part of this contract, the aeromagnetic data were acquired and processed by Aerotec Ltd. Data acquisition occurred during September-November, 1998. Products from this survey are available from the Alaska Division of Geological & Geophysical Surveys, 124 University Ave., Suite 200, Fairbanks, Alaska, 99702. Phone 907-451-5000; web site <http://www.adggs.alaska.gov>.

COLOR SCHEMES
The Gaussian and equal area color schemes used here are those built into the Phoenix Vision imaging program produced by Geometrics, Inc. The histograms display the differences in the color schemes. These histograms show the relative number of magnetic values that are colored a particular color for each color scheme.
The Gaussian color scheme produces a Gaussian fit that best matches the background level of the grid. Fewer points are colored magenta and red. This scheme shows more detail in the high.
With the equal area color scheme, the color intervals for the data are chosen so that an equal or nearly equal number of data points are in each interval. More detail is visible in the middle color range than in the equal area scheme.

TOTAL FIELD MAGNETICS OF THE LOWER YUKON DELTA, ALASKA

Laurel E. Burns

2002



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Notes include but are not limited to: Survey history, magnetic base, scale, etc.

DESCRIPTIVE NOTES

The aeromagnetic data were acquired using a Sikorski HO 4400 helicopter magnetometer and an FMS ANOVA 4 automatic computer installed in a HO 4400 helicopter. In addition, the FMS ANOVA 4 digital acquisition system recorded data from both radio and laser altimeters. From the GPS magnetometer system, from the altimeter and from the radio altimeter, differential processing of the GPS data resulted in a relative positional accuracy of 10 meters or better.

SURVEY DATE: SEPTEMBER-OCTOBER 1986
AIRBORNE INSTRUMENTATION: 200 HERTZ SIKORSKI HO 4400 HELICOPTER MAGNETOMETER AND AN FMS ANOVA 4 AUTOMATIC COMPUTER INSTALLED IN A HO 4400 HELICOPTER.
SCALE: 1:50,000
RESOLUTION: 15 METERS
COLLECTOR: 15 METERS
CONTAINER: 15 METERS
CONTAINER INTERVAL: 5.0 METERS
TRACKING INTERVAL: 5.0 METERS
TO LINE INTERVAL: 5.0 METERS

TOTAL FIELD MAGNETICS

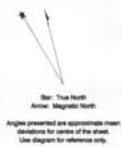
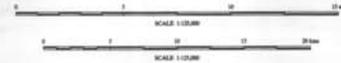
The total field magnetic contours were produced using digitally recorded data from a Sikorski HO 4400 helicopter magnetometer with a sampling interval of 10 seconds. The magnetic data were 10 corrected for diurnal variation by subtraction of the digitally recorded base station magnetic data, 10 reduced to the 1980 datum, and 10 corrected for magnetic variation by subtracting the IGRF 1980 update to October 1985 and adding a file of 1985-11, and 10 projected onto a regular 500m grid.

MAGNETIC CONTOURS

54750 Magnetic reading in γ
 Contour extension direction indicates positive gradient.

MAGNETIC CONTOUR INTERVAL

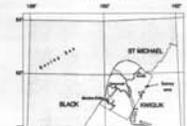
500 γ
 100 γ
 50 γ
 5 γ



SURVEY HISTORY

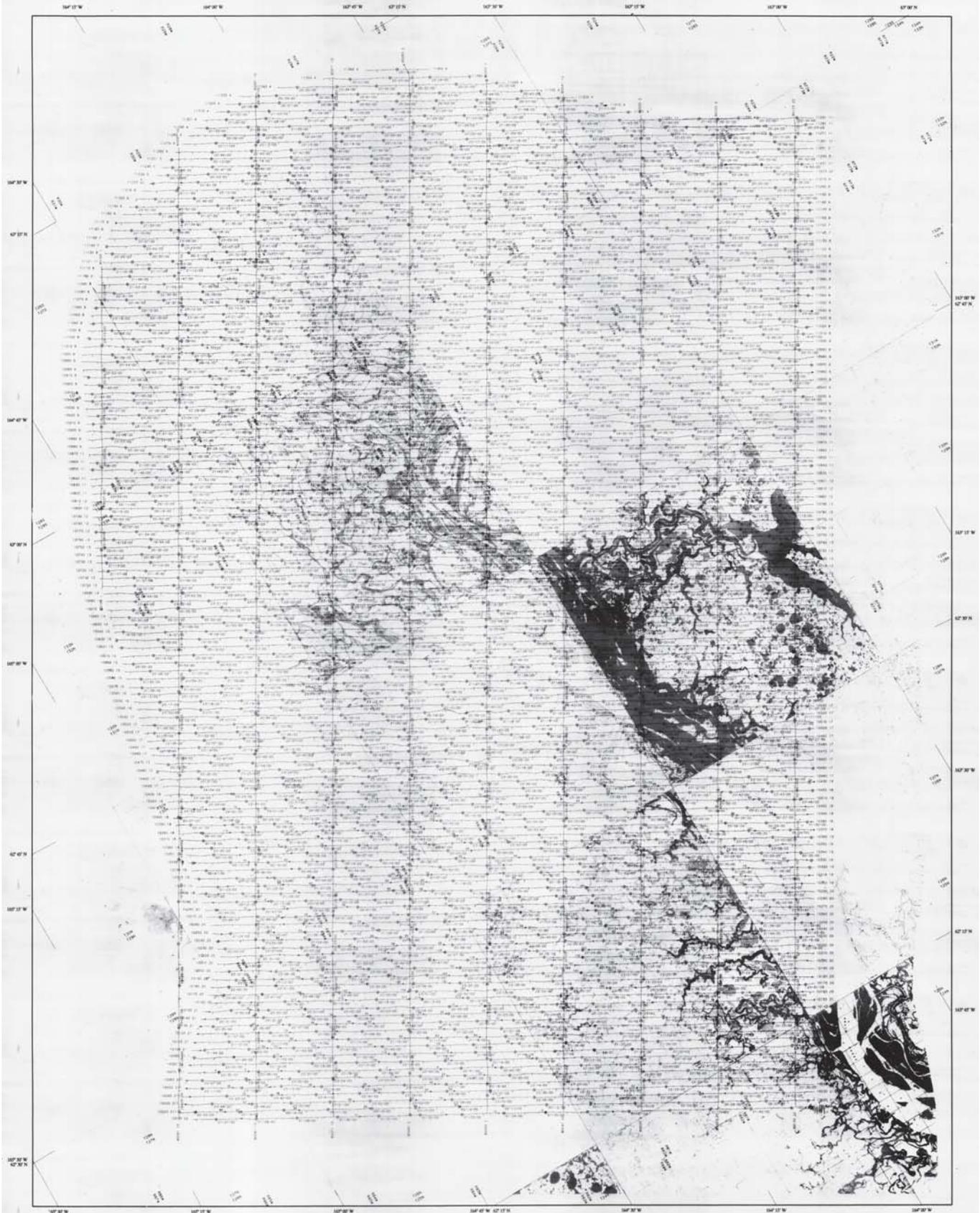
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey, and Geopac Engineering & Research Organization. The aeromagnetic data were acquired by Aeromac Ltd. during the period of September-November, 1986. Products from the survey are available from the Alaska Division of Geological & Geophysical Survey, 704 University Ave., Suite 201, Fairbanks, Alaska, 99706.

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TOTAL FIELD MAGNETICS OF THE LOWER YUKON DELTA, ALASKA

IGRF REMOVED
1996



Scale bar from U.S. Geological Survey, Washington, D.C.
Scale 1:125,000

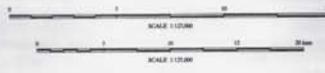
DESCRIPTIVE NOTES

The aeromagnetic data were acquired using a Selenia III cesium vapor magnetometer and an IBM AS/400 digital computer system. The AS/400 system recorded data from both north and south sensors, from the GPS magnetometer system, from the GPS north and from the video camera. Differential processing of the GPS data resulted in a relative positional accuracy of 10 meters or better.

SURVEY DATE: SEPTEMBER-NOVEMBER 1995
AVERAGE SENSOR ELEVATION: 300 FEET ABOVE TERRAIN
CLIMB RATE (SPINDLE): 4750 FEET PER MINUTE
ACCELERATION: 75 G (GROSS) NORTH
DECIMATION: 1/32 SECOND PER SAMPLE
INTENSITY: 0.475 G/T
CONTAINER INTERVAL: 5.000 SECONDS
TRACKING INTERVAL: 1.000 SECONDS
FILE NAME: 950901.DAT

TOTAL FIELD MAGNETICS

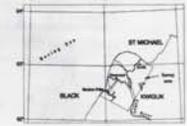
The total field magnetic contours were produced using digitally recorded data from a Selenia III cesium vapor magnetometer with a sampling interval of 0.3 seconds. The magnetic data were (1) corrected for diurnal variation by subtraction of the digitally recorded base station magnetic data, (2) leveled to the sea level datum, and (3) corrected for regional variation by subtracting the 1995 IGRF model for October 1995 and adding a base of 54750 nT, and (4) resampled onto a regular 250m 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 Survey, and Zonge Engineering & Research Organization. The aeromagnetic data were acquired by Ronald Lee during the month of September-November 1995. Products from this survey are available from the Alaska Division of Geological & Geophysical Survey, The University Ave., Suite 200, Fairbanks, Alaska, 99709.

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FLIGHT PATH MAP OF THE LOWER YUKON DELTA, ALASKA



Survey outline from U.S. Geological Survey topographic base map (Scale: 1:50,000) (1963) (1963) (1963)

DESCRIPTIVE NOTES

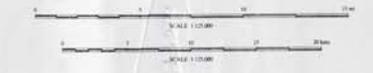
The aeromagnetic data were acquired using a Sylvania 100 centimeter magnetometer and an IBM AS/400 automatic computer installed in a 600 Aero Commander (bearing south). In addition, the IBM DAS8 digital acquisition system recorded data from both radio and magnetic antennas from the GPS magnetotelluric system from the 80 Hz GPS data recorded in a relative positional accuracy of 10 meters or better.

SURVEY DATE SEPTEMBER-NOVEMBER 1986
AVERAGE AIRBORNE ELEVATION 80 FEET ABOVE TERRAIN
FLYLINE 100 SPACING 100 METERS (328 FT)
INCLINATION 71.1 DEGREES NORTH
DECILINATION 10.0 DEGREES EAST
ANTENNA 5, 20, 100, 300 ft
CONTAINER INTERNAL 0.5 m
TRAVELING INTERNAL 0.5 m
TRAIL INTERNAL 0.5 m

TOTAL FIELD MAGNETICS

The total field magnetic contours were calculated using digitally recorded data from a Sylvania 100 centimeter magnetometer with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variation by subtraction of the digitally recorded base station magnetic data, (2) modeled to the 50 line scale, and (3) corrected for magnetic variation by subtracting the IGRF data updated in October 1980 and adding a base of 54700 nT, and (4) resampled onto a regular 200m grid.

- INTERPRETATION LEGEND**
- Thin to magnetic contour interval. Contour interval is a multiple of 40 nT.
 - Volcanics
 - Acidic flows and ultrabasic rocks, probably of recent age, expressed at the surface.
 - Basalt. Quaternary horizontal flows and associated volcanic cones expressed at the surface.
 - *Folded sedimentation of surficially deposited *volcanics and lacustrine.
 - Magnetic lineations probably associated with faulting and/or intrusion dikes.
 - Boundary for faultlike disturbance area.
 - Magnetic lineations interpreted as associated with faults and possible horizontal displacement.
 - Interpreted surface intrusions probably similar to the Igarka. Contour interval expressed in the Russian Mountains.
 - Magnetic contours calculated from the total magnetic field using vector decomposition.
 - Magnetic contours calculated from the historical magnetic gradient using vector decomposition.
 - Position of absolute depth to magnetic basement using vector decomposition.



SURVEY HISTORY

This area has been completely and shown under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Geomorphological & Research Organization. The aeromagnetic data were acquired by Aeromac Ltd. during the period of September-November, 1986. Products from this survey are available from the Alaska, Division of Geological and Geophysical Surveys, 700 University Ave., Suite 200, Fairbanks, Alaska 99709.

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INTERPRETATION MAP OF THE LOWER YUKON DELTA, ALASKA