BROAD PASS ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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ABSTRACT

This Broad Pass electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Bonnifield mining district, about 160 kilometers south of Fairbanks, Alaska and about 250 kilometers north of Anchorage, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM® system from July to August 2001. A total of 1970.2 line kilometers were collected covering 689.5 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform (“bird”) on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska’s most promising mineral belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. One placer gold prospect in the survey area is Windy Creek. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

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

ACKNOWLEDGMENTS

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² Fugro Airborne Surveys Corp.,
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REFERENCES


http://doi.org/10.14509/2830


Figure 1. Broad Pass electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Broad Pass 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. Simulated magnetic total field grid with orthometric image. The simulated magnetic total field data were created using digitally recorded data from a Picodas MEP-710 processor with Geometrics G822 sensor cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2000, updated to August 2001), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.
Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.
Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM\textsuperscript{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model (Fraser, 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model (Fraser, 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM® EM EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model (Fraser, 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
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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/10.14509/30415](http://doi.org/10.14509/30415).
FLIGHT LINES
OF THE BROAD PASS AREA,
SOUTHWESTERN BONNIFIELD MINING DISTRICT,
CENTRAL ALASKA
PARTS OF HEALY QUADRANGLE
2002
TOTAL MAGNETIC FIELD
OF THE BROAD PASS AREA,
SOUTHWESTERN BONNEFIELD MINING DISTRICT,
CENTRAL ALASKA
PARTS OF HEALY QUADRANGLE
2002

DESCRIPTIVE NOTE

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COLOR SHADOW TOTAL MAGNETIC FIELD
OF THE BROAD PASS AREA,
SOUTHWESTERN BONNIFIELD MINING DISTRICT,
CENTRAL ALASKA

PARTS OF HEALY QUADRANGLE
1982

Sun Azimuth: 135 degrees
Sun Inclination: 35 degrees
TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE BROAD PASS AREA, SOUTHWESTERN BONNIFIELD MINING DISTRICT, CENTRAL ALASKA
PARTS OF HEALY B-3 AND B-4 QUADRANGLES
2002
7200 Hz COPLANAR RESISTIVITY OF THE BROAD PASS AREA, SOUTHWESTERN BONNIFIELD MINING DISTRICT, CENTRAL ALASKA

PARTS OF MEANY QUADRANGLE

2002
900 Hz COPLANAR RESISTIVITY
OF THE BROAD PASS AREA,
SOUTHWESTERN BONNIFIELD MINING DISTRICT,
CENTRAL ALASKA
PARTS OF HEALY QUADRANGLE
2002
900 Hz COPLANAR RESISTIVITY
OF THE BROAD PASS AREA,
SOUTHWESTERN BONNIFIELD MINING DISTRICT,
CENTRAL ALASKA
PARTS OF HEALY QUADRANGLE
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